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Family Economics and Nutrition Review

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The U.S. Food Supply Series, 1970 to 1994: Nutrient Availability and Policy Implications

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The U.S. food supply series measures the amount of nutrients available per capita per day. This paper reviews trends in food supply consumption and nutrient levels for 1970 to 1994. Substantial change in the U.S. food supply during this period led to per capita availability increases for most nutrients, except for saturated fatty acids, cholesterol, and vitamin B_{12}. Food and nutrient level trends are examined in terms of Federal dietary guidance, nutrition monitoring activities, and fortification policy. Future research directions are suggested to improve the quality of food supply estimates in terms of these activities.

Dietary guidance to improve the public health and well-being of Americans has been in place since early this century (25)—a period similar to that covered by the U.S. food supply series. The translation of this dietary guidance into recommendations for a healthful diet and the successful implementation of these recommendations require that the consumer has greater access to affordable health-promoting foods. Thus, the quantity and nutrient composition of the foods available for consumption are vital to increasing the prevalence of healthy eating. Technological alterations, the designing of foods, and enrichment and fortification policy during this century have increased the variety of foods in the food supply as well as enhanced the health benefits associated with these foods. For example, the removal of nutrients or dietary components from foods has increased the variety of lower fat dairy and leaner meat products in the food supply, while the addition of nutrients to food through enrichment and fortification has improved the nutritional quality of the food supply.

This article discusses trends in U.S. food and nutrient supplies since 1970, compares data for 1970 and 1994, and considers the significant implications of

these data for food and nutrition policy. The U.S. food supply series measures the amount of food available for consumption per capita per year and the amounts of nutrients per capita per day *(5,14)*. It is the only continuous source of data on food and nutrient availability in the United States. Food supply nutrient estimates, extended back to 1909, were calculated for the first time during World War II to assess the nutritive value of the food supply for civilian use in the United States and to provide a basis for international comparisons with the food supplies of our allies.

Per capita food supply estimates provide unique and essential information on the amount of food and nutrients available for consumption. They are useful to assess trends in food and nutrient consumption over time, for monitoring the potential of the food supply to meet the nutritional needs of Americans, and for examining relationships between food availability and diet-health risk. Therefore, the U.S. food supply series is one of the five major components of the National Nutrition Monitoring and Related Research Program (NNMRRP), mandated by the National Nutrition and Related Research Program Act of 1990 *(4)*. In addition, because the food supply series has measured food and nutrients over time using the same conceptual methodology, it is useful for evaluating the effects of technological alterations, advertising and promotion efforts, changes in marketing practices, and nutrition education policies. It also helps agricultural policymakers translate nutrient recommendations into goals for food production and supply levels to ensure that adequate nutrients are available to Americans (see box, "About the Data").

Food Consumption Trends Are Driving Major Changes in Nutrient Availability

During 1970-94, substantial change in the quantity and mix of foods in the U.S. food supply produced marked change in nutrient availability. Much of the change is due to advances in technology and alterations in marketing practices, as well as to Federal dietary guidance[1] to make healthy food choices that promote health and prevent disease. The introduction of many foods into the food supply since 1970 reflects industry's response to this dietary guidance and consumer demand for a variety of low-fat, flavorful, and nutritious food choices. Production techniques and marketing changes over the last two decades have been particularly responsive to and reflective of dietary recommendations for fat, saturated fat, and cholesterol. The creation of newly formulated foods or the modification of foods or ingredients used in foods has enhanced the health benefits of the food supply.

Per capita food supply estimates provide unique and essential information on the amount of food and nutrients available for consumption.

[1]Current Federal dietary guidance as used in this paper considers the following: *Recommended Dietary Allowances (tenth edition) (11), Nutrition and Your Health: Dietary Guidelines for Americans (4th ed.) (20), The Food Guide Pyramid (18), and the Diet and Health Implications for Reducing Chronic Disease Risk (10).* These serve as the basis for nutrition policies of the Federal Government. Earlier Federal dietary guidance, which influenced production and consumption practices in the late 1970's and 1980's, includes *Dietary Goals for the United States* (1977) *(24), Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention* (1979) *(21), Nutrition and Your Health: Dietary Guidelines for Americans* (1980) *(19),* and *Diet, Nutrition and Cancer* (1982) *(9).*

About the Data

USDA's Center for Nutrition Policy and Promotion uses data on the amount of food available for consumption from USDA's Economic Research Service (ERS) and information on the nutrient composition of foods from USDA's Agricultural Research Service (ARS)[1] to calculate the nutrients available in the U.S. food supply. Nutrients reported include food-energy, energy-yielding components (carbohydrate, protein, and fat), cholesterol, 10 vitamins, and 7 minerals.

Food supply data, collected and published annually by ERS, estimate the amount of food available for consumption in the United States by measuring commodity flows from production to end uses. Food available for consumption is calculated as the difference between available commodity supplies (the sum of production, imports, and beginning-of-the-year inventories) and the sum of exports, year-end inventories, and nonfood uses. Foods are measured as primary commodities before they are combined with other foods or processed into final products seen in the market place.

The food supply consumption estimates reflect amounts of food available prior to moving through marketing channels—not the amounts actually consumed. Therefore, the supplies are greater than what individuals ingest due to losses in trimming, cooking, plate waste, and spoilage that are not accounted for in the estimates. For example, the food supply estimates overstate human consumption of fats and oils, since large amounts are used for frying by fastfood establishments and later discarded as waste. Also, increasing proportions of the total turkey supply go into pet foods, but such use is included in per capita turkey estimates and thus overstate turkey consumption *(14)*.

The food supply nutrient estimates are calculated by multiplying the per capita amount of each food by the nutrient composition of that food. The results from approximately 400 foods are then totaled for each nutrient and presented on a per day basis. As with the food supply estimates, the nutrient estimates presented here do not account for losses during processing, marketing, or home use and are better indicators of trends in consumption rather than actual amounts ingested. For example, vegetables generally lose nutrients when cooked in water, particularly water-soluble nutrients like vitamin C and thiamin.

Nutrients not included in these values are those from phosphorus contained in carbonated soft drinks, vitamin and mineral supplements, alcoholic beverages (or the grains and sugar used to make alcoholic beverages), baking powder, yeast, and certain vitamins and minerals used for functional or flavoring agents in foods. Nutrients added to foods commercially through enrichment and fortification are included in the nutrient values.

Food supply data differ from dietary survey data: food supply data measure food and nutrient availability as national totals whereas dietary survey data (such as USDA's Continuing Survey of Food Intakes by Individuals) provide data on food and nutrient intakes reported by individuals and households. Dietary or food intake surveys record food intake data over a specific time period and combine it with demographic information. These data are used to assess food consumption behavior and the nutritional content of diets for policy implications relating to food production and marketing, food safety, food assistance, and nutrition education.

Both the food supply and food intake data are major components of the NNMRRP, a set of related Federal activities intended to provide regular information on the nutritional status of the U.S. population. However, both have strengths and limitations that affect their ability to measure food consumption and their usefulness in dietary assessment. For example, food supply estimates reflect the amount available prior to moving through marketing channels, not the amount actually consumed. Thus, supplies are greater than what individuals ingest due to losses in processing, marketing, home use, and spoilage that are not accounted for in the estimates. Likewise, nutrient estimates determined for food supplies do not account for these losses and need to exceed those recommended for good health by a generous amount to account for such losses and to ensure adequate nutrients are available to the U.S. population. Also, these levels represent averages for the entire population. As a result, food supply data typically overestimate food and nutrient availability and are better indicators of trends in consumption over time rather than actual amounts ingested.

On the other hand, the quality of dietary or food intake surveys depends on the appropriateness of the methodology used for data collection and on the accuracy and completeness of the recall or recording of the individual. Underreporting of total diet or different food groups is common with these surveys. Because of such limitations, food intake surveys may underrepresent actual food intakes.

Due to the current limitations of these two types of data, their joint application is best directed toward trend analysis of food and nutrient consumption. The U.S. food supply series serves this purpose well since the conceptual basis for measuring food and nutrient estimates has remained the same over the series. However, apparent trends from food intake surveys may be misleading due to changes in survey design, sampling strategy, and interview methodology from one survey to another.

[1]Nutrient data used for the most recent update are from the Primary Nutrient Data Set developed for use with the 1994 Continuing Survey of Food Intakes by Individuals (CSFII) *(17)*.

Table 1. The U.S. food supply nutrient per capita per day, 1970 and 1994

Nutrient (unit)	1970	1994	Percent change
Food energy (Kcal)	3,300	3,800	15
Carbohydrate (g)	386	491	27
Protein (g)	95	110	16
Total fat (g)	154	159	3
Saturated fatty acids (g)	54	52	–4
Monounsaturated fatty acids (g)	63	65	2
Polyunsaturated fatty acids (g)	26	31	19
Cholesterol (mg)	470	410	–13
Vitamin A (RE)	1,500	1,520	1
Carotenes (RE)	510	660	29
Vitamin E (mg)	13.7	16.9	23
Vitamin C (mg)	107	124	16
Thiamin (mg)	2.0	2.7	35
Riboflavin (mg)	2.3	2.6	13
Niacin (mg)	22	29	32
Vitamin B_6 (mg)	2.0	2.3	15
Folate (µg)	279	331	19
Vitamin B_{12} (µg)	9.5	8.1	–15
Calcium (mg)	890	960	8
Phosphorus (mg)	1,460	1,680	15
Magnesium (mg)	320	380	16
Iron (mg)	15.4	21.2	38
Zinc (mg)	12.2	13.2	1
Copper (mg)	1.6	1.9	19
Potassium (mg)	3,510	3,780	8

The food supply provides a wide variety of healthy food choices, but compliance with dietary recommendations is often slow and not easily achieved by the general population. For example, although Americans have made some positive dietary changes in terms of consumption of grain products, vegetables, and fruits and the use of lower fat animal foods from the dairy and meat groups, they are doing less well with overall consumption of sugars and sweeteners and total fat. This finding agrees with recent studies that found, on average, most Americans are not meeting recommended servings for most of the Food Guide Pyramid's five major food groups, particularly whole grains, fiber-rich fruit, and dark-green, deep-yellow vegetables, while consuming excess calories from fats and sugars *(1,7)* from foods such as cheese, salad and cooking oils and shortening, and regular carbonated soft drinks, respectively.

Availability of Nutrients, 1970-94

Per capita nutrient estimates show higher levels for most nutrients in 1994 than in 1970, except for saturated fatty acids, cholesterol, and vitamin B_{12} (table 1). The level of food energy reached an all-time high of 3,800 calories per capita per day in 1994, in part due to a higher level of carbohydrate. The considerable increase in carbohydrate reflects the increased use of both grain products and total sugar and sweeteners (specifically, corn syrup sweeteners) (fig. 1, p. 6). During the late 1980's, grains replaced sugars and sweeteners as the major source of carbohydrate. By 1994, grains provided 41 percent of the total carbohydrate in the food supply (fig. 2, p. 6).

Between 1970 and 1994, the percent kilocalories from complex carbohydrate in the total food supply increased from 22 to 26 percent, and that from sugar decreased slightly from 25 to 24 percent. While these trends are consistent with dietary guidance to choose a diet with plenty of grain products and high in complex carbohydrates, Americans still need to work harder to consume less foods high in sugar. In 1994, Americans consumed a record high amount of caloric sweeteners. Much of this came from the increased consumption of carbonated soft drinks. Between 1970 and 1994, per capita consumption of these regular drinks increased from 22 gallons to 40 gallons, while that from diet drinks increased from 2 gallons to 12 gallons per capita.

As with carbohydrate, the levels of several vitamins and minerals rose because of the increased consumption of grain products. For example, levels of thiamin, riboflavin, and niacin,[2] which rose due to the increase in the proportion of enriched flour since 1970 *(15)*, are higher still in the 1990's because of increased grain consumption in more recent years (table 1). In 1994, riboflavin contributions from grain products were similar to those from dairy products, the leading source of riboflavin in 1970. Likewise, niacin contributions from grain products in 1994 were similar to those from meat, poultry, and fish products, the leading source of niacin in 1970. Since 1970, the higher levels of vitamin B_6, folate, phosphorus, magnesium, iron, zinc, copper, and potassium are, for the most part, related to increases

[2]Food composition data give only the amount of preformed niacin in food. Thus, per capita niacin estimates for the food supply refer to the availability of preformed niacin from foods—not that formed in the metabolism of tryptophan.

Figure 1. Trends in grains and sugars in the U.S. food supply, 1970-94

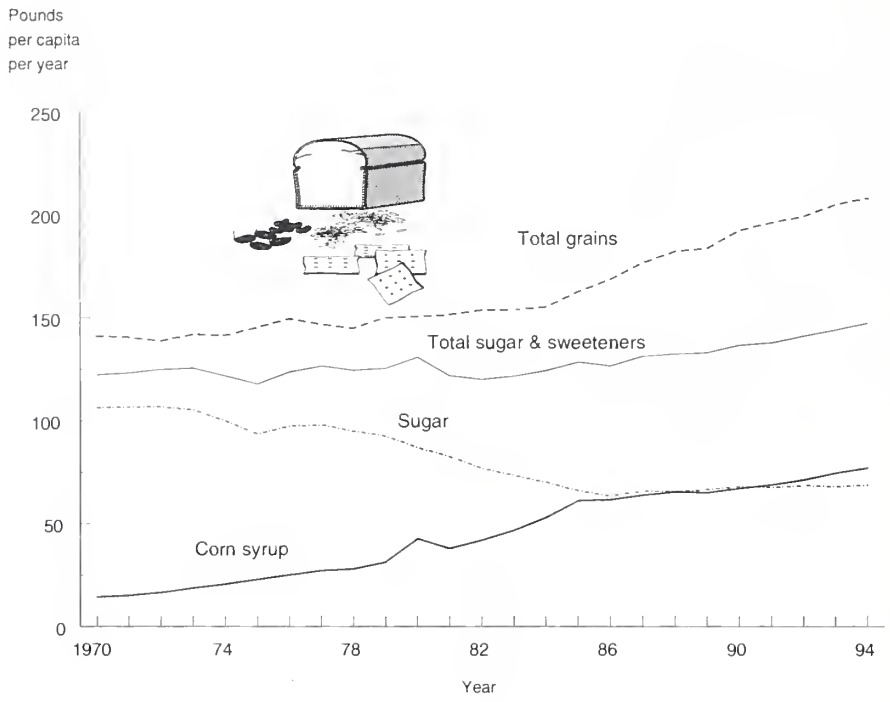


Figure 2. Sources of carbohydrate in the U.S. food supply, 1970 and 1994

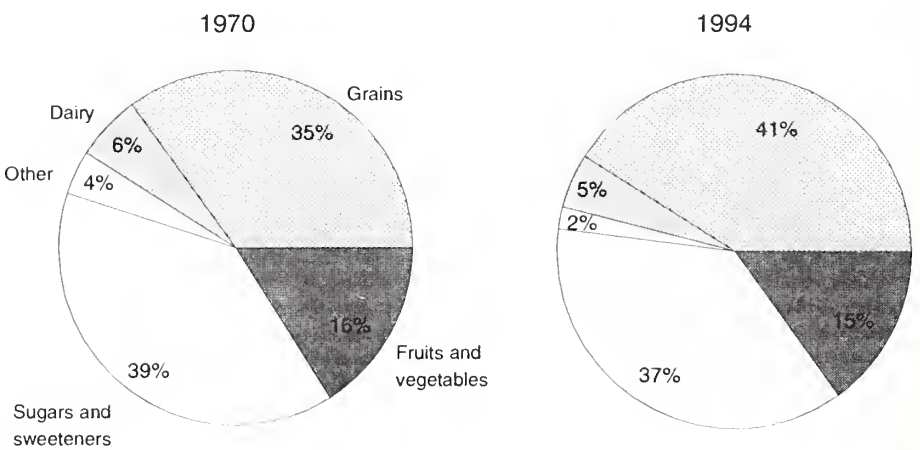
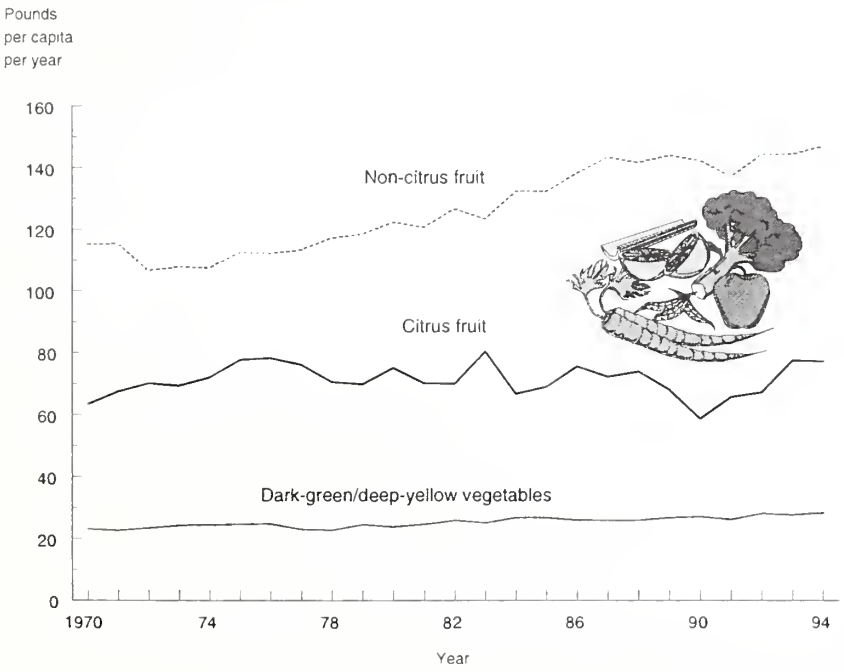


Table 2. Percent contribution from grains for selected nutrients in the U.S. food supply, 1970 and 1994

Nutrient	1970	1994
Carbohydrate	35	41
Thiamin	40	55
Riboflavin	19	31
Niacin	28	40
Vitamin B_6	8	13
Folate	13	22
Phosphorus	14	21
Magnesium	18	26
Iron	37	51
Zinc	12	18
Copper	17	23
Potassium	6	10

Figure 3. Trends in fruits and green/yellow vegetables in the U.S. food supply, 1970-94



in grain consumption. Grain consumption contributed over one-fifth of the folate, phosphorus, and copper, over one-fourth of the magnesium, and over one-half of the iron in the food supply in 1994 (table 2).

Another trend seen between 1970 and 1994 that is consistent with dietary guidance is the increase in vegetable and fruit availability. In 1994, vegetables and fruits made important nutrient contributions to levels of vitamin A, carotene, vitamin C, folate, and potassium in the food supply. Despite the fact that the vitamin A level increased only slightly due to a decrease in egg and organ meat consumption, larger nutrient contributions than in previous years came from the dark-green and deep-yellow vegetables in the vegetable group—the largest contributor of vitamin A to the food supply. Consumption of dark-green and deep-yellow vegetables increased from 23 to 28 pounds between 1970 and 1994, contributing to higher levels of both vitamin A and carotene in 1994 (fig. 3).

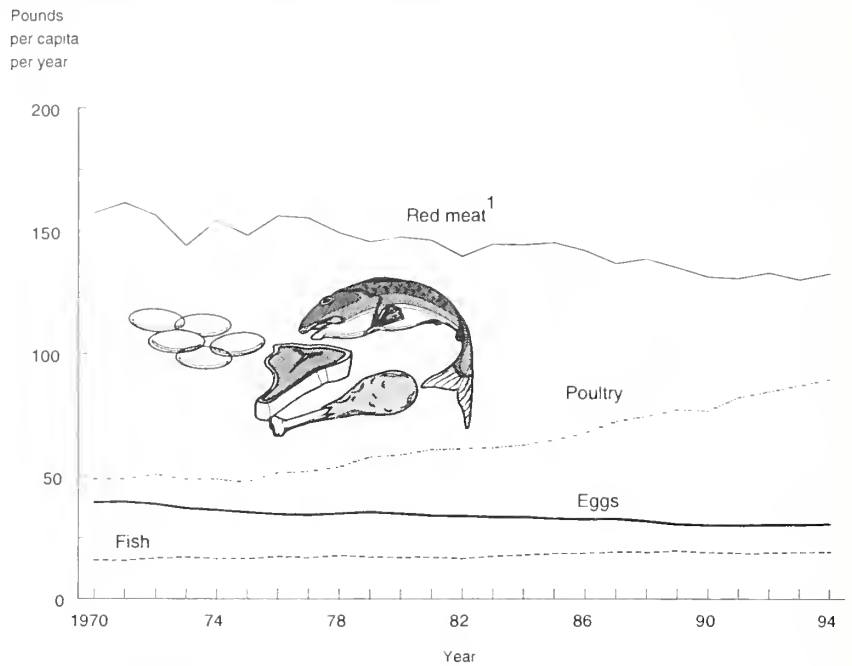
Vitamin C reached a peak in 1994 due to increases in variety and year-round availability of fresh citrus fruits. Since 1970, fruits and vegetables have been responsible for about 90 percent of the vitamin C in the food supply. Also, higher levels of folate and potassium are associated with the trend in increased fruit consumption (as well as grain consumption). Although not contributing to an increase in potassium levels, the vegetable group continued to be the primary source of this nutrient from 1970 to 1994.

Trends in consumption of the dairy and meat, fish, poultry, and egg groups in the food supply are closely associated with levels of protein, fats, fatty acids, and cholesterol and to levels of selected nutrients, such as calcium and phosphorus in dairy foods, and iron, zinc, and vitamin B_{12} in meat and egg products. The increase in protein from 1970 to 1994 is due mostly to higher consumption of poultry, and, to a lesser extent, grain products, cheese, and lowfat milks (figs. 1, 4, and 5).

There was an overall shift in sources of fat from animal to vegetable (fig. 6) from 1970 to 1994. This was primarily caused by the increased use of salad dressings, cooking oils, and vegetable shortening[3] but is also reflected in changes in levels of fatty acids for animal foods. The lower level of saturated fatty acids shows the decreased use of whole milk and increased use of leaner red meats and poultry. Despite lower whole milk consumption, saturated fatty acids from dairy foods increased somewhat between 1970 and 1994 because of consistent year-to-year increases in per capita consumption of cheese. The higher level of polyunsaturated fatty acids reflects the increased use of vegetables oils. Higher vitamin E levels are related to this trend as well, with the fats and oils group providing over three-fifths of the vitamin E to the food supply between 1970 and 1994. The level of cholesterol, a dietary component of the lipid family and found only in animal products, declined because of the lower consumption of eggs and red meat and the shift from fluid whole milk to lowfat and skim milks (figs. 4 and 5). The lower level of vitamin B_{12} in 1994 is also due to decreased consumption of eggs as well as organ meats.

[3]See box "About the Data" for limitations of fat data.

Figure 4. Trends in meats and eggs in the U.S. food supply, 1970-94



[1]Includes beef, pork, lamb, veal, and game.

Figure 5. Trends in dairy products in the U.S. food supply, 1970-94

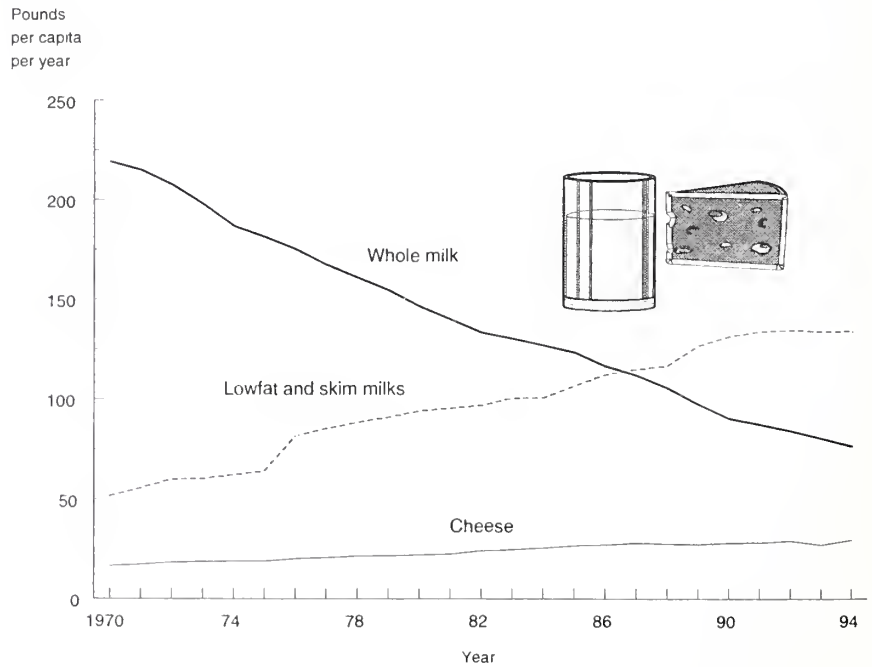


Figure 6. Fat sources in the U.S. food supply, 1970 and 1994

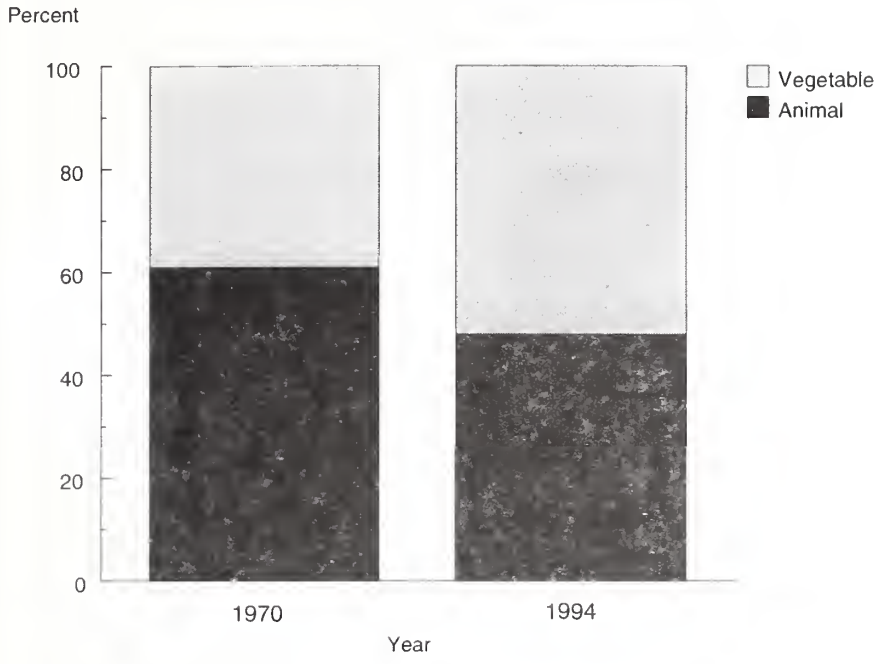
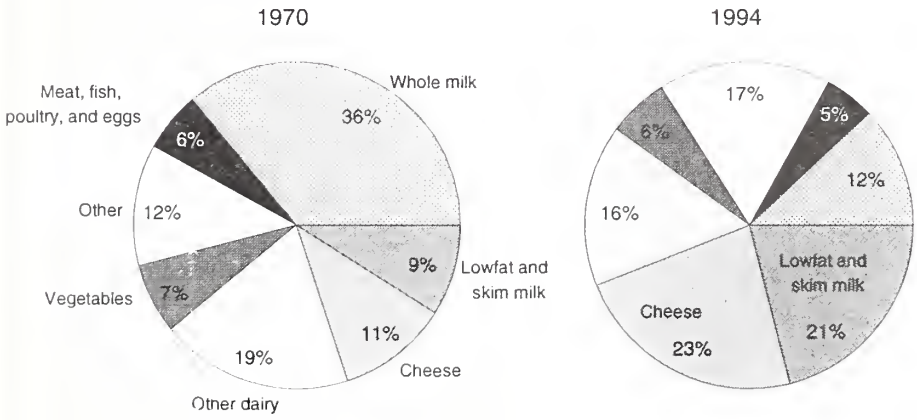


Figure 7. Sources of calcium in the U.S. food supply, 1970 and 1994



With the decline in consumption of whole milk and beverage milks overall, increased calcium levels are due...to increases in cheese consumption....

The dairy group is the primary source of both calcium and phosphorus, contributing about three-fourths of the calcium and one-third of the phosphorus in the food supply between 1970 and 1994 (fig. 7, p. 9 and fig. 8). An increased consumption of cheese was principally responsible for higher levels of both of these nutrients, with calcium and phosphorus contributions from cheese doubled from 11 to 23 percent and 5 to 10 percent, respectively, between 1970 and 1994.

With the decline in whole milk consumption and the shift to lowfat and skim milk between 1970 and 1994, calcium contributions more than doubled from lowfat and skim milk, but were only one-third those from whole milk in 1970 (fig. 7). Overall, calcium contributions from beverage milks were less in 1994 than in 1970 due to the decreased consumption of these milks. Although lowfat and skim milk contributions to total magnesium in the food supply increased in 1994 over those in 1970, this increase was not enough to prevent the shift from the dairy group to the grain group as the main contributor of magnesium in 1994 (fig. 9).

The meat, poultry, and fish group continued to provide important and relatively stable contributions of both magnesium and phosphorus and to be the primary contributor of zinc in the food supply between 1970 and 1994 (figs. 8-10). However, the higher level of zinc in 1994 was due to increased grain consumption as the zinc contributions from the meat, poultry, and fish group declined and those from dairy products remained stable during this period (fig. 10).

Figure 8. Sources of phosphorus in the U.S. food supply, 1970 and 1994

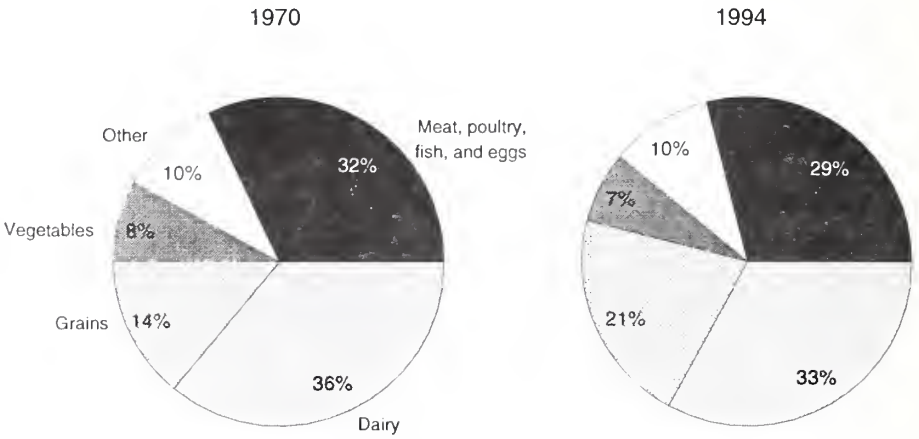


Figure 9. Sources of magnesium in the U.S. food supply, 1970 and 1994

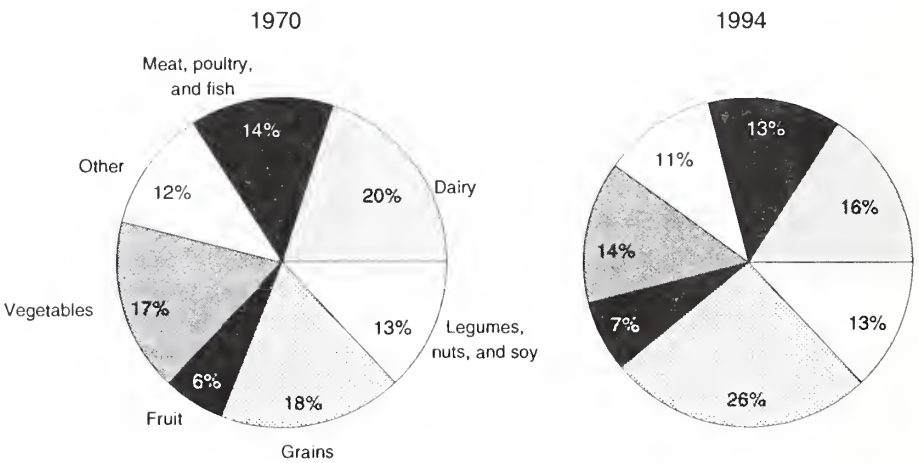
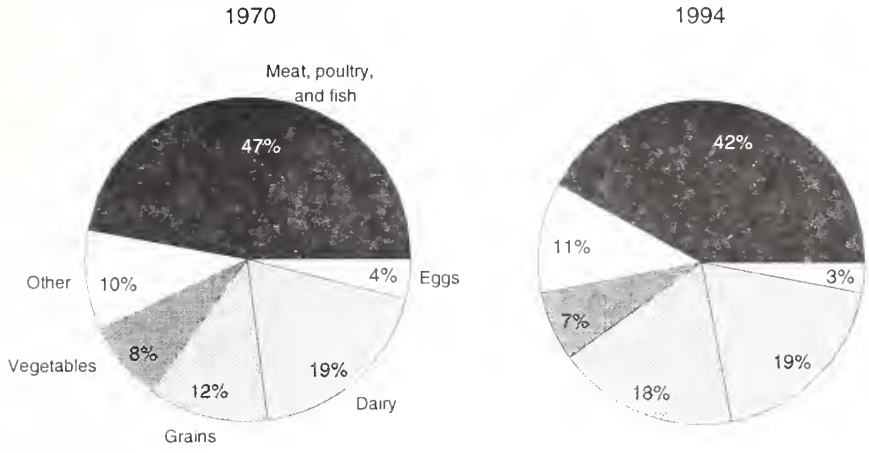


Figure 10. Sources of zinc in the U.S. food supply, 1970 and 1994



Significant Implications of U.S. Food Supply Data for Food and Nutrition Policy

Public Health Issues: Nutrient Availability Compared With Federal Dietary Guidance

Whereas early dietary guidance was directed toward the avoidance of deficiency diseases, current guidance is focused on the role of the diet in the etiology and prevention of chronic diseases (see box, p. 12, "Federal Dietary Guidance"). The Recommended Dietary Allowances (RDAs) *(11)*, established in 1943, have served as the basis for the nutritional content of foods and diets, and over the years, a nutritionally adequate food supply was linked to providing sufficient energy, macronutrients, and micronutrients to meet the needs of consumers *(16)*. With expanded scientific knowledge of the roles of nutrients since the inception of the RDAs, the purpose of the food supply has become more complex, ranging from the prevention of classical nutritional deficiency diseases, such as rickets, to one of reduction of the risk of such chronic diseases as cardiovascular disease, cancer, and osteoporosis.

To better serve this purpose, food supply-related research is based on activities specified in the Ten-Year Comprehensive Plan *(23)*, the basis of the planning and coordination of the NNMRRP. Per capita data indicate that the U.S. food supply is capable of providing recommended nutrient levels for the total population; however, dietary selection is quite variable and may not be adequate for some individuals because of social, cultural, and economic factors *(13)*. The Third Report on Nutrition Monitoring in the United States (TRONM), prepared for the Interagency Board of the NNMRRP, has classified several food components as current or potential public health issues (table 3, p. 13) *(4)*. Food components classified as current public health issues are associated with dietary intake disease risk, such as obseity, coronary heart disease, anemia, or osteoporosis. Those food components classified as potential public health issues require additional research to develop

...the purpose of the food supply has become more complex, ranging from the prevention of classical nutritional deficiency diseases...to one of reduction of the risk of...chronic diseases....

Federal Dietary Guidance

Federal dietary guidance is outlined in *Nutrition and Your Health: Dietary Guidelines for Americans* and illustrated graphically in the *Food Guide Pyramid* (figs. a and b) *(18,20)*. Both are designed to help Americans, 2 years of age and older, choose diets that meet their nutritional needs and improve health by reducing chronic disease risks. The fourth edition of the Dietary Guidelines bulletin, published in 1995, outlines seven dietary recommendations that consumers should adopt for better health:

- Eat a variety of foods
- Balance the food you eat with physical activity—maintain or improve your weight
- Choose a diet with plenty of grain products, vegetables, and fruits
- Choose a diet low in fat, saturated fat, and cholesterol
- Choose a diet moderate in sugars
- Choose a diet moderate in salt and sodium
- If you drink alcoholic beverages, do so in moderation.

The Dietary Guidelines bulletin recommends that people choose a diet that provides no more than 30 percent of total calories from fat and less than 10 percent of calories from saturated fat. Additionally, it discusses the role of enriched and fortified foods in the diet and highlights good sources of several nutrients of concern to public health.

Figure a. Nutrition and Your Health: Dietary Guidelines for Americans

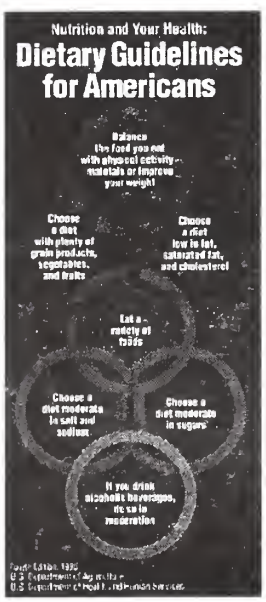


Figure b. Food Guide Pyramid

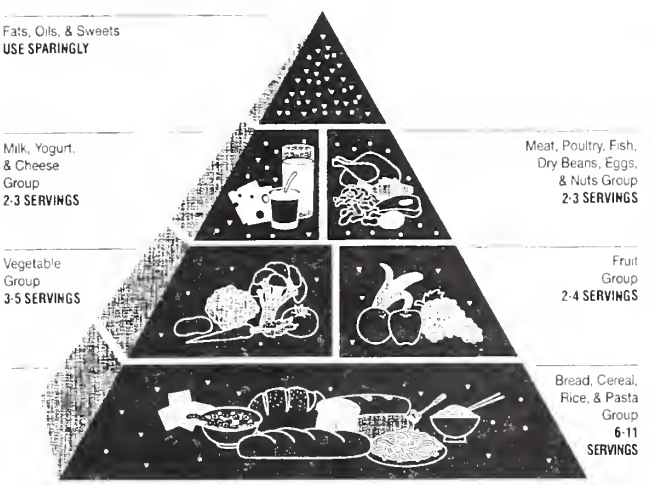


Table 3. Classification of food components as public health issues in the Third Scientific Report on Nutrition Monitoring[1]

Current public health issues	Potential public health issues	Not current public health issues
Food energy	Total carbohydrate	Thiamin
Total fat	Dietary fiber	Riboflavin
Saturated fatty acids	Sugar	Niacin
Cholesterol	Polyunsaturated fatty acids	Iodine
Alcohol	Monounsaturated fatty acids	
Iron	*Trans* fatty acids	
Calcium	Fat substitutes	
Sodium	Protein	
	Vitamin A	
	Vitamin C	
	Vitamin E	
	Carotenes	
	Folate[2]	
	Vitamin B_6	
	Vitamin B_{12}	
	Magnesium	
	Potassium	
	Zinc	
	Copper	
	Selenium	
	Phosphorus	
	Fluoride	

Modified from: *Third Report on Nutrition Monitoring in the United States (4).*

[1]This classification of nutrients should be regarded as provisional. As new data become available, future assessments of public health significance and of the levels of monitoring needed will result in changes in the categorization of some food components.

[2]Since the publication of this classification table, the relationship of folic acid to neural tube defects has been much publicized. In 1996, FDA announced that effective January 1, 1998, folic acid must be added to most enriched flour, breads, corn meals, rice, noodles, macaroni, and other grain products. This action heightens the folate role in national nutrition monitoring, and reclassification of this nutrient may be necessary.

...food supply nutrient estimates must be as accurate as possible to support policy decisions that improve the nutritional status of Americans.

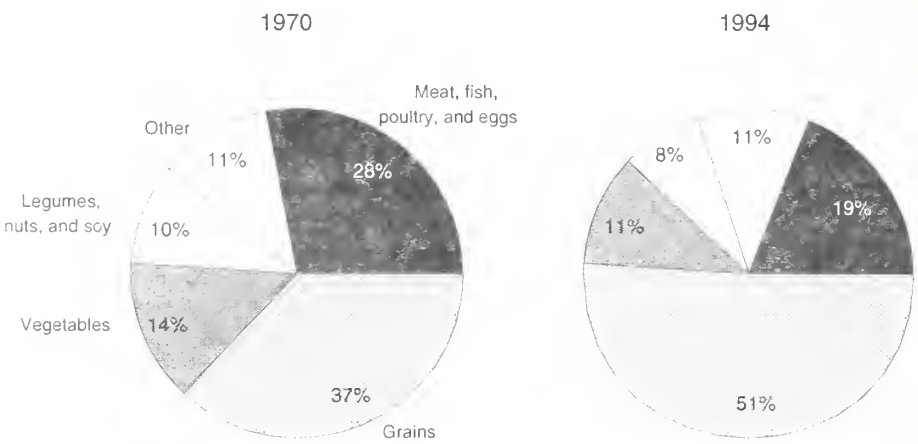
interpretive criteria to link monitoring data to functional or health outcomes and/or improved food composition data.

Currently, the intake recommendations for many nutrients and dietary components are under scientific evaluation by the Food and Nutrition Board of the Institute of Medicine, National Academy of Sciences as part of the Dietary Reference Intake project. To complement this evaluation and because of the important roles played by iron, folate, and calcium in public health and in nutrition and fortification policy, the intake and availability levels of each of these nutrients are compared with Federal dietary guidance.

Iron deficiency is the most prevalent nutrient deficiency in America, with some of the most serious concerns related to its effects on the health and development of infants and children *(6)*. Infants, adolescents, and women of childbearing age are those who are most at risk of developing anemia. Their greater iron needs, due to rapid growth or excessive blood loss during menstruation, usually cannot be met by dietary intake alone.

In 1994, the level of iron in the food supply was about 6 mg higher than in 1970 (table 1). The trend towards increased iron reflects increased iron fortification of breakfast cereals and increased consumption of grain products between 1970 and 1994 (fig. 11). At 21.2 mg per capita per day, the average content of the food supply exceeded recommendations for all sex-age groups with the exception of pregnant women. This does not mean, however, that all Americans ingest the recommended amounts of iron, since food supply estimates can overestimate what is actually consumed.

Figure 11. Sources of iron in the U.S. food supply, 1970 and 1994

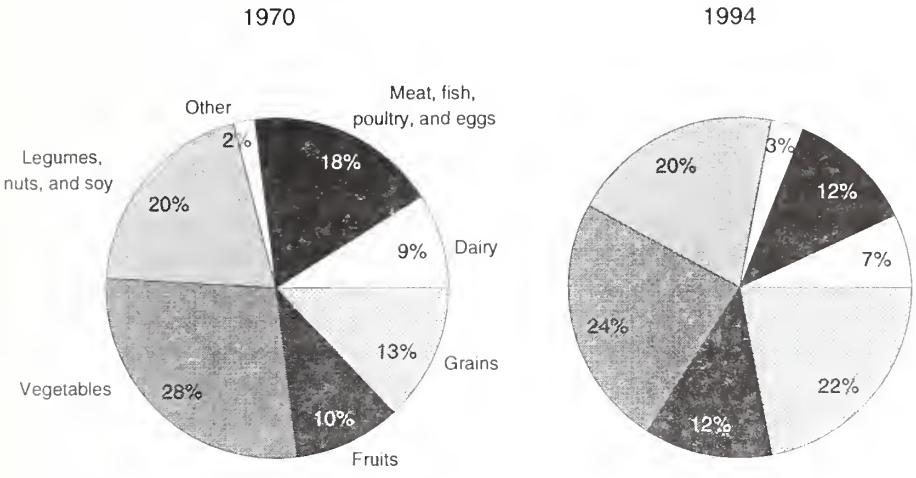


According to data from USDA's 1994 Continuing Survey of Food Intakes by Individuals (CSFII), Americans as a whole consumed an average of 136 percent of their Recommended Dietary Allowance (RDA) for iron from food sources (intake data do not include dietary supplements). However, whereas male adults 20 to 49 years old were getting 182 percent of their RDA, females of the same age were consuming 82 to 88 percent of their RDA, on average.

Epidemiological evidence indicates that low serum folate levels are associated with elevated serum homocysteine, an independent risk factor for vascular disease, and that the use of dietary supplements containing folate by females before they become pregnant and during early pregnancy is associated with a decreased incidence of some types of neural-tube defects *(4)*. In response to this, the Food and Drug Administration (FDA) recently directed that a folate fortification policy of 140 µg per 100 gm for cereal-grain products, along with fortification of ready-to-eat breakfast cereals up to 100 µg per serving and 400 µg per unit or serving for supplements, be implemented in early 1998 *(22)*. FDA's goal is to increase folate intakes for the target population (women of childbearing age) as close as possible to recommended intakes while maintaining safe levels for all other people *(26)*.

In 1994, the level of folate available in the food supply was about one-fifth higher than the level in 1970 (table 1). This is due to an increase use of grain products and citrus fruit. However, the vegetable and legumes, nuts, and soy groups continue to be the major contributors of folate (fig. 12). At 331 µg per capita per day, the average content

Figure 12. Sources of folate in the U.S. food supply, 1970 and 1994



...the addition of nutrients to foods through enrichment and fortification has been an effective way to maintain and improve the overall nutritional quality of the U.S. food supply....

of folate in the food supply exceeded recommendations for all sex-age groups except pregnant women. According to estimates from USDA's 1994 CSFII, Americans as a whole consumed an average of 169 percent of their RDA for folate with no population subgroup falling below 100 percent of the RDA; however, the 1989 RDA does not account for the safety factor needs of folate for women of childbearing age.

Calcium is essential for the formation of bones and teeth, and requirements increase significantly during adolescence, early adulthood, pregnancy, and lactation. Calcium is very important from a public health perspective because current calcium intakes may be insufficient to attain optimal peak adult bone mass and to prevent age-related loss of bone mass. Inadequate intake of calcium may increase the risk of osteoporosis, a condition in which decreased bone mass weakens bone. In 1994, a National Institutes of Health Consensus Development Conference on Calcium Intake recommended that the current RDA for calcium be increased to between 1,000 and 1,500 mg, depending on age and other health factors, to help reduce the risk of this disease *(8)*.

The calcium level in 1994 was higher than in 1970 (table 1). With the decline in consumption of whole milk and beverage milks overall, increased calcium levels are due primarily to increases in cheese consumption (fig. 7). At 960 mg per capita per day, the average content of the food supply failed to meet calcium recommendations for all males and females 11 to 24 years of age and for pregnant and lactating women.[4]

[4]The food supply calcium level of 960 mg in 1994 was adequate to provide the RDA by sex-age group when the RDA was based on the population distribution as determined by Census. More of the population require 800 mg than 1,200 mg; thus 960 mg was sufficient on a national basis.

According to estimates from USDA's 1994 CSFII, Americans as a whole consumed an average of 92 percent of their RDA for calcium. The intake by males ranged from 91 to 118 percent of the RDA and men 20 years and over averaged 107 percent of the RDA. The intake by females ranged from 67 to 82 percent of the RDA and women 20 years and over averaged 75 percent of the RDA. These calcium intakes indicate that individuals are not consuming enough of the foods rich in calcium available to them in the food supply, much less the amounts that are currently being suggested by many health experts. This finding has policy implications for nutrition educators as they design nutrition education programs to increase calcium consumption, especially for adolescent girls and women, and for policymakers as they consider strategies for improving calcium intakes of Americans.

The Role of Food Fortification in Meeting Public Health Objectives for Chronic Disease Prevention

Historically, especially during the 1930's and 1940's, the addition of nutrients to foods through enrichment and fortification has been an effective way to maintain and improve the overall nutritional quality of the U.S. food supply and to solve the public health problems seen earlier in this century *(16,26)*. For example, enrichment of cereal-grain products has been an extremely effective means of enhancing the nutrient quality of the food supply and serves as a practical and effective public health strategy for providing required nutrients. Cereal grains are eaten by essentially all population groups. Other nutrient-deficiency diseases were dealt with by fortifying various foodstuffs with specific nutrients. By the 1950's, four specific programs—fortification of salt with iodine; fortification of milk with vitamin D; enrichment of flour and grains with thiamin, riboflavin, niacin, and iron; and fortification of margarine with vitamin A—were in effect for the addition of nutrients to the U.S. food supply.

Over time, guidelines for food fortification have evolved, as interest in adding nutrients to foods has shifted from prevention of deficiency diseases to broader issues of improving overall health. Food fortification policy has also been established for other commodities and additional nutrients. Although grain products have proven to be the most suitable vehicles for fortification in the food supply, fortified foods also include (but are not limited to) ready-to-eat cereals, fruit drinks and juice, meal replacement bars and beverages, infant formulas, margarine, and milk-based products. Many juice drinks are fortified with vitamin C, which is the key vitamin provided by most juices and juice drinks. As a result of fortification, some juices and juice drinks are also a good source of calcium and vitamin A as beta-carotene.

Nutrient additions supplement the amount of thiamin, riboflavin, niacin, iron, iodine, and vitamins A, C, and D in the food supply substantially and the prevalence of specific nutrient deficiencies in the population has been greatly reduced. In particular, the gradual rise in the percentage of white flour that is enriched has contributed to increased levels of thiamin, riboflavin, niacin, and iron *(15)*, accounting for over half of the thiamin and iron, two-fifths of the niacin, and almost one-third of the riboflavin in the food supply (table 2) in 1994. Also, the fortification of margarine with vitamin A accounts for about 9 percent of the total vitamin A in the food supply.

Because the food supply series measures foods and nutrients over time, the impact of added nutrients for purposes of enrichment and fortification of basic food commodities can be gauged. This important association of the food supply with fortification policy continues to be monitored with research activities directed towards the evaluation and determination of nutrients added to the food supply for enrichment, fortification, and functional purposes.

If nutrient requirements can be met readily by the food supply without nutrient addition, then nutrition educators can develop programs to help individuals meet nutrient requirements or improve nutrient intakes. However, a dietary recommendation to increase intake of a particular nutrient may hinder the food supply's ability to provide an adequate level of that nutrient. In this case, policymakers need to consider fortification options or other strategies to improve the food supply. Most recently, the public health goal of increasing folate intakes for women of childbearing age to reduce the occurrence of neural-tube defects in infants led FDA to rule that cereal-grain products be fortified with folic acid by January 1, 1998 *(22)*.

Future Directions

Scientific evidence on the relationship between diet and health and the importance of fortification in public health require accurate and updated information on the quality and composition of the American diet. Such information is used to determine the extent to which diets differ from Federal dietary guidance and to monitor the dietary and nutritional status of Americans. In order for policymakers to translate dietary guidance into goals for food production and supply levels and to make appropriate decisions regarding food fortification, the link between food supply and food intake data needs to be better understood. This requires further research and analysis of these two types of data to recognize their differences and similarities. Additionally, to minimize the limitations of food supply data and to better translate per capita food consumption and nutrient estimates into intake data, improved food supply estimates of fats and oils and discard and processing factors are needed.

Also, research is needed to update the fortification data base that supports the U.S. food supply series. Several studies have looked at how the nutrient content of the food supply has been affected by enrichment and fortification *(2,3,12)*. The earlier study *(2)* showed that fortification and enrichment of grain products provide a significant proportion of the thiamin, niacin, iron, and riboflavin supply for the average American. More recent studies *(3,12)* have examined the effect of food fortification in terms of distribution of nutrient intakes by population subgroups as well as over-fortification of the food supply. Both studies acknowledge the importance of fortifying the food supply as a public health intervention to improve nutritional intake of a particular nutrient by a target population.

Nutrient data bases that account for added nutrients are limited and the U.S. Department of Agriculture (USDA) nutrient data bases do not routinely identify levels of added nutrients. As a result, the food supply fortification data base has not been updated since 1970, except for the percentage of flour, enriched. Since 1970, enormous changes in food industry fortification practices have occurred and both the range of fortified foods and the number of added nutrients have expanded. An updated version of USDA's food composition data base, designed to include nutrients added to foods commercially through enrichment and fortification, is needed to generate more accurate food supply nutrient estimates for policy work on fortification issues and nutrient recommendations. As a major component of the NMRRP, food supply nutrient estimates must be as accurate as possible to support policy decisions that improve the nutritional status of Americans.

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Nutrient Intakes and Eating Patterns of Teenagers

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When compared with current dietary recommendations, diets of teenagers are marked by underconsumption of several vitamins and minerals, as well as dietary fiber, and overconsumption of fat and saturated fat. This paper examines nutrient intakes of adolescents 13-18 years of age by gender and race using a nationally representative sample from the 1989-91 Continuing Survey of Food Intakes. It also explores food consumption and meal patterns in order to gain insights into dietary behavior that may be useful in developing nutrition promotion messages and strategies. Average intakes of female adolescents were below recommendations for vitamin E, calcium, iron, and zinc. Average intakes of male adolescents were lower than recommended for vitamin E, calcium, and zinc. Mean vitamin A intakes of Black teenagers were also below recommendations. Dietary fiber intakes were below recommendations for all subgroups. Overall, teens averaged 35 percent of calories from fat and 13 percent from saturated fat, with no significant differences between subgroups. Examining food group intakes, male teenagers did not meet recommendations for consumption of foods from the fruit, vegetable, and grain groups. Black male teens and female teens of both races did not meet recommendations for the fruit, vegetable, grains, or milk groups. Examination of meal patterns revealed that females, especially Black females, tended to skip breakfast more than males. Black teenagers were significantly more likely to skip lunch than Whites. The results suggest potential strategies for tailoring nutrition promotion efforts to the dietary problems and eating patterns of teens.

Dietary surveys of adolescents between the ages of 13 and 18 years have revealed two disturbing trends: underconsumption of vitamins, minerals, and dietary fiber, especially by females; and higher than recommended intakes of fat and saturated fat. During adolescence, the demands of physical maturation require more calcium, iron, and energy than at any other age *(26)*. Because teenage males eat more food than females, they are less likely to have intakes below recommendations, with the exception of calcium and dietary fiber *(9,40)*. However, findings from

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The School Nutrition Dietary Assessment Study, the 1987-88 Nationwide Food Consumption Survey (NFCS), and the second National Health and Nutrition Examination Survey (NHANES II) confirm that many teenage females fall short of meeting the recommended dietary allowances (RDAs) established by the Food and Nutrition Board of the National Academy of Sciences *(25)* for calcium, iron, magnesium, and zinc *(12,13,15,18)*.

In addition to gender differences in nutrient intake, racial differences have also been noted. Analyses of the 1987-88 NFCS and the NHANES II found consumption of calcium by Black adolescents was lower than that of White teens *(12,13,21)*. Iron deficiency in adolescent females has also been found to be associated with race. Results from NHANES II indicated 8 percent of non-Hispanic Black females 12-15 years of age and 14 percent of those 16-19 years old were iron-deficient compared with fewer than 4 percent of White females in those age categories *(20)*.

Overconsumption of fat and saturated fat is also characteristic of teens' diets. This dietary imbalance may increase risk of chronic health problems later in life *(38)*, and may contribute to the growing problem of adolescent obesity. According to findings from NHANES II and NHANES III, the prevalence of obesity between the ages of 12 and 17 jumped from 16 percent to 21 percent between the 1970's and the 1980's *(33)*. Several studies find the trend to obesity more prevalent among low-income and racial minority children and adolescents *(3,33)*. Diets high in calories and fat have been associated with obesity in children and adolescents *(28)* as have a lack of physical activity *(5)* and an abundance of hours spent watching television *(10,28,29)*.

Although these findings indicate several nutritional problems occurring in this age group, few studies using national survey data have reported on eating patterns that contribute to these problems. In this study, data from the U.S. Department of Agriculture's 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII) were used to assess nutrient consumption and eating patterns of a national sample of White non-Hispanic and Black non-Hispanic[2] teenagers. A previous analysis of CSFII data found that only 11.6 percent of boys and 7.2 percent of girls between the ages of 12 and 18 consume the number of daily servings of fruits and vegetables recommended in the USDA/DHHS Food Guide Pyramid *(19)*. The current study expands on previous work by examining teenagers' consumption of all five of the major food groups defined in the Food Guide Pyramid *(35)* and the meals at which they are eaten. This information can be used to help design more effective nutrition promotion interventions by tailoring messages to actual eating behaviors.

Methods

Sample

The USDA Continuing Survey of Food Intakes by Individuals (CSFII) is an ongoing national survey. In 1989-91, households were selected for the survey using a stratified area probability sampling method that over-samples for low-income households. Data collected between 1989 and 1991 included consumption information from each household member for 3 consecutive days, using the dietary recall method for the first day and the food record method for the second and third days. The survey was designed to collect dietary information on all days of the week and all seasons of the year to avoid temporal biases. In this study, only the first day's data were used because many subjects did not complete the second and third days of dietary data. Dietary recalls were conducted by a trained interviewer who probed as necessary to ensure complete descriptions of foods and beverages and to check for omissions. If a household member was absent at the time of the interview, the main meal planner/preparer was asked to report what that person ate.

The 1989-91 CSFII included 1,087 adolescents between the ages of 13 and 18 years who provided 1-day dietary recalls. For this study, the sample was screened for teenagers between the ages of 13 and 18 who were living at home with at least one parental figure and who were not pregnant or nursing. Further screening removed outliers for self-reported consumption above 7,000 calories per day. Finally, 36 individuals whose dietary records included a high proportion of foods (greater than 10 percent of total calories) with incomplete information on meal time or name of eating occasion were removed from the data base. The resulting sample comprised 926 adolescents of whom 735 were White and 191 were Black. Information on racial and cultural origins was self-reported.[3]

[2]These groups will be referred to as White and Black for the remainder of the article.

[3]The sample included teens of Hispanic origin, American Indian/Eskimo, and Asian/Pacific Islander races; however, these groups had insufficient sample size for statistical tests conducted in this article and were therefore omitted from the study sample.

White females consumed more milk, and Black females ate more foods from the meat group, particularly poultry.

In this sample, about 36 percent of the responses were provided primarily by the main meal planner on behalf of the teenager. When these responses were compared with information on consumption of major food groups that was provided primarily by the teenagers themselves, no significant differences were found. Therefore, information from parent-respondents was used for the study.

Definition of Variables

Dietary intakes of protein, carbohydrates, and fat were calculated as percent of total energy (calories). Consumption of vitamins and minerals was calculated as a percent of the individual's RDA.[4] Nutrient intakes were computed from reported food consumption using a data base developed for this survey *(36)*. Reported values represent intake from food only. CSFII respondents were queried on use of vitamin-mineral supplements, but the information obtained was not precise enough to translate into measured intake. Frequency of use of vitamin-mineral supplements is reported, however.

To analyze eating patterns, eating occasions were defined by the respondent as breakfast, lunch, supper, or a snack. Self-reported snacks remained classified as snacks when they were reported in addition to meals, regardless of energy value. In some cases individuals reported not eating a meal, but did report eating a snack around those meal times. Following a protocol used to assess eating occasions in a previous study *(22)*, snacks eaten in lieu of meals that provided more than 50 calories were recoded as breakfast if they were consumed between 4:30 and 11:00 a.m.; lunch if between 11:01 a.m. and 3:00 p.m.; and supper between 3:01 p.m. and 10:00 p.m. Eating occasions that totaled 50 calories or less remained classified as snacks, even if no meal was reported.

Grams of foods consumed were converted to servings consistent with the Food Guide Pyramid using a data base developed by USDA's Center for Nutrition Policy and Promotion (CNPP) for this purpose. Mixed foods were disaggregated into their basic Pyramid components (for example, a ham and cheese sandwich was disaggregated into ham, cheese, and bread, and each component placed in the appropriate group). Categorization of foods and food components into food groups was consistent with Food Guide Pyramid definitions *(35)*. For example, french-fried potatoes were defined as vegetables in the Food Guide Pyramid and therefore were placed in the vegetable group; ice cream was considered part of the milk, yogurt, and cheese group and was placed in that group.

Survey data report food intake by weight (grams); however, the weight of a serving size may vary from item to item. For example, 3/4 cup tomato juice and 1/2 cup cooked tomato are each considered a serving of vegetable but weigh slightly different amounts. To translate intake into serving amounts, serving sizes for all foods consumed by survey respondents were identified using USDA information *(31,36)* and the gram weight equivalent for each serving size was identified using the USDA Survey Codebook *(37)*. In some cases, food ingredients that provided only small amounts (less than 1/4 of a serving) of a Pyramid food group were not counted toward the group total. Baby foods, fats and oils, sugars, soft drinks, coffee, tea, or other foods not counted in at least one of the five major food groups were not included in the data base.

[4]RDAs are age- and gender-specific.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) *(32)* was used to calculate average nutrient intake and consumption of foods. Weights developed by the USDA to adjust for variable probabilities of selection, differential nonresponse rates, and sampling frame considerations were applied to the sample in order to obtain results more generalizable to the U.S. population. SUDAAN, a statistical analysis program designed for use with survey data collected using a complex, stratified sampling design *(30)*, was used to derive standard errors and to conduct student t-tests and chi-square analyses for assessing differences between groups.

Results

Description of Sample

As shown in table 1, the sample was distributed almost equally between males and females. The average age was 16 years. The majority were White and lived in households with two parents. In this sample, Black teenagers were more likely than Whites to live in single-parent households (fig. 1, p. 24). Household income as a percentage of the Federal poverty level was used as an indicator of subjects' socioeconomic status. Black teenagers, on average, came from households at 184 percent of the poverty level, compared with White teenagers at 381 percent.

The average body mass index (BMI)[5] for the sample was 21.6, and 63 percent of the respondents had BMIs between 19 and 26. A BMI of 26 is a recommended cut-off for the definition of obesity in adolescents *(18)*. Of those teens who did not fall into this range, 23 percent had BMIs below 19 and 14 percent had BMIs above 26. Fewer than 4 percent of the sample had BMIs greater than 30, a marker for severe obesity.

[5]BMI was calculated based on self-reported heights and weights.

Nutrient Consumption

Tables 2, p. 25 and 3a, p. 26 confirm findings from previous national surveys on deficiencies and excesses in diets of teenagers. For the total sample, the proportion of energy (calories) from fat (35 percent) and saturated fat (13 percent) exceeded current recommendations of no more than 30 percent and less than 10 percent, respectively. Average cholesterol intake approached, but did not surpass, the recommended ceiling of 300 mg per day, except for White males. Cholesterol consumption by Black females was significantly higher than that by White females. Among all groups, dietary fiber consumption ranged from 11 to 16 grams, below the "age plus five" levels recommended by the American Health Foundation for children and adolescents *(39)*. Intakes by females were particularly low, with White females averaging 11.2 grams of dietary fiber per day and Black females averaging 11.0 grams/day.

Examining nutrient intakes from food, average intakes by all age-sex groups exceeded their RDAs for vitamin C and folate, but consumption of other vitamins and minerals fell short of recommendations for some subgroups. Among females, calcium consumption averaged only 67 percent of their RDA. Females' average intakes of vitamin E, iron, and zinc were about 80 percent of their RDAs for these nutrients. Consumption of all vitamins and minerals tended to be lower among

Table 1. Demographic characteristics of teenagers[1]

Characteristics	Percent
Gender	
Male	51.1
Female	48.9
Race	
White	82.5
Black	17.5
Age (years)	
13	16.1
14	16.9
15	17.7
16	15.5
17	16.6
18	17.2
Region	
Northeast	19.6
Midwest	26.4
South	37.4
West	16.6
	Percent poverty
Household income	
Total	347
White	381
Black	184

[1]Weighted data.

Black females than among White females, and the difference was significant for vitamin A. Mean vitamin A intakes of Black females were below recommendations, but intakes of White females were not.

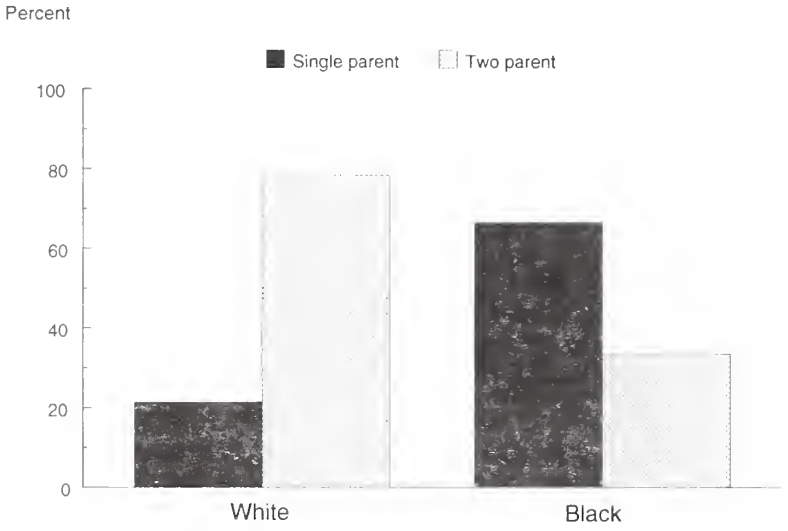
On average, males met or exceeded 90 percent of their RDAs for most vitamins and minerals with the exception of vitamin E, for which they averaged 88 percent of their RDA. Consumption by Black males tended to be less than consumption by White males for all vitamins and minerals, and these differences were significant for vitamin E, calcium, and zinc.

As shown in table 3b, about one-quarter of teens use vitamin-mineral supplements at least occasionally. Usage was significantly higher among Whites (28.2 percent) compared with Blacks (8.7 percent). It was slightly higher among males than females (26.7 percent compared with 22.7 percent), but the difference was not significant.

Consumption of Foods

The Food Guide Pyramid provides recommended serving ranges for each of the five major food groups. Within those ranges, individuals are advised to choose more or less servings based on their caloric needs. The USDA's Healthy Eating Index *(34)* has identified specific serving recommendations for the major age-sex groups, based on their usual caloric requirements (fig. 2, p. 27). These serving recommendations can be used as a basis for comparison with actual food group servings consumed by adolescents. Table 4, p. 28 summarizes the average daily number of Food Guide Pyramid servings consumed by teenagers in the sample. Consumption of most major food groups tended to be slightly higher for White teens, but the differences were not significant for most foods. Blacks' intake of the meat, fish, poultry, dry beans, eggs, and nut group (hereafter called "meat group" for simplicity) was higher than that of White teens, and this difference was significant for females. For all teens in the sample, consumption of whole-grain products accounted for a small proportion of foods eaten from the bread, cereal, rice, and pasta group (hereafter called "grain group" for simplicity). The majority of grain products consumed were white bread or rolls, which accounted for 26.5 percent of grains eaten. Starchy vegetables, including french fries, comprised 39.3 percent to 58.4 percent of total vegetable intake for the teens in the sample, with the proportions tending to be slightly higher for Black teens. Black teens also tended to consume more dark-green vegetables compared with Whites, but all teens, on average, ate much less than one serving of dark-green or deep-yellow vegetables daily.

Figure 1. Household structure of White and Black teenagers



Consumption by Males

Males, on average, consumed less than the recommended number of servings for plant-based foods at the base of the Pyramid. The average daily consumption of foods in the grain group, 7.75 servings, was low compared with the recommended levels of 9.9 servings for males 11-14 years old, and 11 servings for males 15-18. Consumption of vegetables, 2.3 servings, was about half of the recommended amount (4.5-5 servings). White males ate significantly more fruits than Blacks (1.05 and 0.37 servings, respectively), but consumption for both groups was far less than the recommendation of 3.5-4 servings. Differences between White and Black males were also significant for the average consumption from the milk, yogurt, and cheese group (2.53 and 1.66 servings), and only White males met recommendations (3 servings). Servings of the meat group, averaging 4.45, exceeded the recommendations (2.6-2.8 servings).

Table 2. Nutrient consumption: Macronutrients by teenagers, 1 day, CSFII 1989-91[1]

Nutrient	Total sample			Males			Females		
	Total (n = 926)	White (n = 735)	Black (n = 191)	Total (n = 460)	White (n = 381)	Black (n = 79)	Total (n =466)	White (n = 354)	Black (n = 112)
Calories	2109	2146	1934	2455	2502	2149	1747	1732	1800
Protein									
Grams	79	80	76	92	94	80	66	64	73
% kcal	15.0	14.8	15.6	15.0	15.0	14.9	15.0	14.7	16.2
Carbohydrates									
Grams	268	274	242	311	316	279	224	226	219
% kcal	50.9	51.1	50.1	50.6	50.5	51.9	51.3	52.1	48.8
Fat									
Grams	83	84	76	97	99	82	68	67	72
% kcal	35.4	35.2	35.4	35.6	35.6	34.3	34.9	34.6	36.0
Saturated fat									
Grams	31	32	27	36	37	29	25	25	26
% kcal	13.2	13.4	12.6	13.2	13.3	12.3	13.0	13.0	12.8
Cholesterol									
Milligrams	259	254	278	296	302	255	219*	198	293
Fiber									
Grams	13.6	13.8	12.7	16.0	16.0	15.5	11.2	11.2	11.0

[1]Weighted data.
* $p \leq .05$ between White and Black.

Consumption by Females

Females' average daily consumption of vegetables (1.71 servings) and fruits (0.77 servings) was less than half of their recommendations for these food groups (4 and 3 servings, respectively). Their average consumption from the grain group (5.32 servings) and milk group (1.70 servings) was comparatively closer to recommended amounts, but still fell short (9 and 3 servings, respectively). Differences between the average consumption of foods from the milk and meat groups by White and Black females were significant. White females consumed more milk, and Black females ate more foods from the meat group, particularly poultry. Total consumption of foods from the meat group by Black females was slightly higher than the recommended 2.4 servings.

Meal Patterns

Table 5, p. 29 and figure 3, p. 30 provide more detailed information on when teenagers were most likely to eat different food types. In tables 5a-5c, consumption of food groups is broken out by eating occasion. Foods from the grain and milk groups were consumed throughout the day, but other food groups appear to be favored at specific eating occasions. Following patterns of typical American diets, foods from the vegetable and meat groups were eaten mostly at lunch and supper. White males are more likely to eat fruit at breakfast or as snacks, whereas Black males had no discernable meal patterns for consuming the low amount of fruit observed with this group. Consumption by White and Black females tended to be more constant throughout the day.

Table 3a. Nutrient consumption: Vitamins and minerals[1] by teenagers, 1 day, CSFII 1989-91[2]

Nutrient	Total sample			Males			Females		
	Total (n = 926)	White (n = 735)	Black (n = 191)	Total (n = 460)	White (n = 381)	Black (n = 79)	Total (n = 466)	White (n = 354)	Black (n = 112)
	Percent RDA								
Vitamin A	99*	104	74	105	108	85	93*	100	68
Vitamin C	168	172	149	184	191	142	151	150	153
Vitamin E	85	87	75	88*	91	65	81	81	82
Calcium	82*	86	62	96*	99	72	67	70	56
Iron	115	119	101	148	149	145	81	83	73
Folate	152	156	135	171	171	171	132	138	113
Zinc	86	88	78	93*	96	73	79	78	81

[1]Intakes are from food only.
[2]Weighted data.
* $p \leq .05$ between White and Black.

Table 3b. Use of vitamin and mineral supplements by teenagers, 1 day, CSFII 1989-91[1]

Usage	Total sample			Males			Females		
	Total* (n = 926)	White (n = 735)	Black (n = 191)	Total (n = 460)	White (n = 381)	Black (n = 79)	Total (n = 466)	White (n = 354)	Black (n = 112)
	Percent								
Everyday	14.0	15.9	4.8	16.5	18.1	5.7	11.3	13.3	4.2
Every so often	10.8	12.3	3.9	10.2	11.4	2.7	11.4	13.3	4.6
Not at all	75.2	71.8	91.3	73.3	70.5	91.6	77.3	73.4	91.2

[1]Weighted data.
* $p \leq .05$ between White and Black.

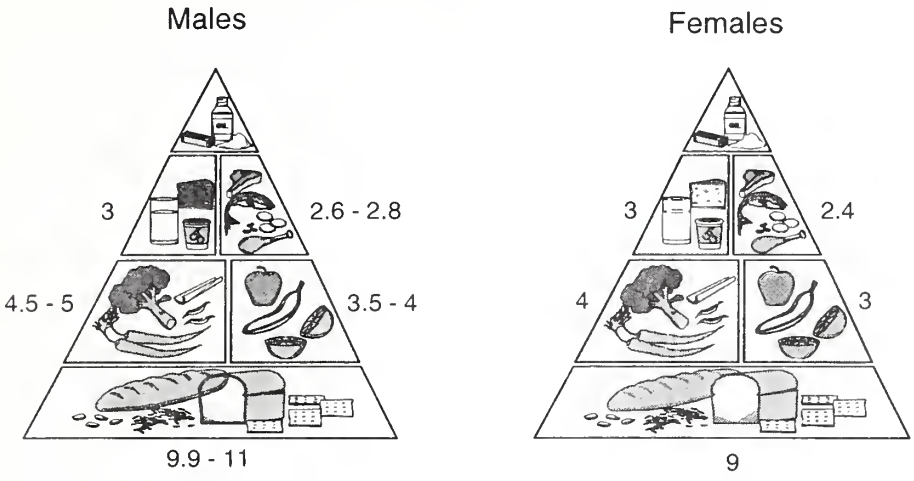
Meal Skipping

As shown in figure 3, all subgroups of teens in this sample generally reported similar meal-skipping behavior. Females tended to skip breakfast more than males, and this was especially pronounced for Black females, of whom only two-thirds reported eating breakfast on the survey day. On average, the great majority of males reported eating breakfast, lunch, and supper. However, Black teens in this sample were significantly less likely to eat lunch than were White teens. Only 57 percent of Black males and 63 percent of Black females reported eating lunch on the survey day. The majority of teens ate snacks; the most common snacking times were between 2:00 p.m. and 4:30 p.m. and between 8:00 p.m. and 10:00 p.m.

Discussion

Before considering the implications of this study, its limitations must be noted. Dietary intake was assessed using 24-hour recall data. Such data are poor estimators of a given individual's usual diet. They are, however, useful in characterizing the intake of groups, given a sufficient sample size.

Figure 2. Recommended numbers of food group servings per day for male and female adolescents, 13-18 years of age



Source: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, 1995, The Healthy Eating Index, CNPP-1 (34).

Black teens in this sample were significantly less likely to eat lunch than were White teens.

Comparison groups were created on the basis of gender and race; however, the groups may also have differed in numerous other characteristics that may have influenced dietary differences reported in this study. In particular, the discrepancy in income between the two racial groups indicates the need for examination of other factors, such as income, when interpreting comparisons between races. A prior analysis of CSFII 1989-91 data found household income to have only a minor influence on nutrient intakes of children and adolescents *(2)*. However, income may affect purchases of specific foods. In a multivariate analysis of women's diets, higher income was found to be significantly associated with increased fruit and vegetable intake *(16)*. Further research examining the effect of household income on adolescents' food and nutrient intakes is indicated.

A documented limitation of dietary recalls is the tendency for respondents to underreport consumption of foods, especially foods high in fat and calories *(23)*. Recommendations from the National Academy of Sciences *(25)* for average energy intake for males and females at median height and weight exceeded those reported in the study by 12 percent for males and 26 percent for females, indicating that some underreporting is likely.

A further limitation of this study was the use of secondary respondents (usually parents) to report some teens' diets. Although we found no significant differences between the average consumption of major food groups or nutrients by teens when "parent-reported diets" were compared with self-reported diets, it would have been preferable to have obtained all dietary data from the teens themselves.

Table 4. Consumption of foods by teenagers (Food Guide Pyramid servings), 1 day, CSFII 1989-91[1]

Food group	Total sample Mean intake			Males Mean intake			Females Mean intake		
	Total (n = 926)	White (n = 735)	Black (n = 191)	Total (n = 460)	White (n = 381)	Black (n = 79)	Total (n =466)	White (n = 354)	Black (n = 112)
Total bread, cereal, rice, and pasta group[2]	6.57	6.75	5.72	7.75	7.86	7.03	5.32	5.45	4.90
Whole grain	1.01	1.04	0.85	1.27	1.31	0.97	0.74	0.73	0.78
Other grain	5.56	5.71	4.86	6.49	6.55	6.06	4.59	4.72	4.12
Grain chips[3]	0.19	0.17	0.24	0.15	0.15	0.16	0.22	0.20	0.28
Total vegetable group[4]	2.01	2.04	1.88	2.30	2.26	2.55	1.71	1.78	1.47
Starchy vegetables	0.85	0.83	0.94	1.01	0.94	1.49	0.68	0.70	0.60
Vegetable chips[5]	0.25	0.21	0.40	0.25	0.28	0.09	0.24	0.14	0.59
Dark-green vegetables	0.10	0.08	0.18	0.11	0.09	0.27	0.09	0.07	0.13
Deep-yellow vegetables	0.07	0.08	0.04	0.08	0.09	0.04	0.06	0.07	0.04
Other vegetables	0.99*	1.05	0.72	1.09	1.14	0.74	0.89	0.94	0.71
Total fruit group[6]	0.87*	0.94	0.56	0.96*	1.05	0.37	0.77	0.80	0.69
Citrus fruit	0.48*	0.53	0.23	0.53*	0.58	0.15	0.43	0.48	0.29
Other fruit	0.39	0.40	0.33	0.43	0.47	0.22	0.34	0.32	0.40
Total milk, yogurt, cheese group[7]	2.06*	2.20	1.45	2.41*	2.53	1.66	1.70	1.81	1.31
Fluid milk	1.56*	1.66	1.10	1.87	1.93	1.49	1.23*	1.34	0.86
Yogurt	0.02*	0.03	0	0.02	0.02	0	0.02*	0.03	0
Cheese	0.48	0.51	0.34	0.52*	0.57	0.18	0.44	0.44	0.45
Total meat, fish, poultry, dry beans, eggs, nuts group[8]	3.80	3.72	4.21	4.45	4.48	4.22	3.13*	2.82	4.21
Meat	2.62*	2.79	1.83	3.18*	3.43	1.53	2.04	2.05	2.01
Poultry	0.96*	0.75	1.97	1.04*	0.85	2.30	0.87*	0.62	1.77
Fish	0.22	0.18	0.41	0.23	0.20	0.39	0.21	0.14	0.43
Legumes	0.16	0.16	0.15	0.21	0.22	0.18	0.10	0.09	0.14

[1]Weighted data.
[2]Elsewhere called "Grains" for simplicity.
[3]Includes tortilla chips.
[4]Elsewhere called "Vegetables" for simplicity.
[5]Includes potato chips.
[6]Elsewhere called "Fruits" for simplicity.
[7]Elsewhere called "Milk" for simplicity.
[8]Elsewhere called "Meat" for simplicity.
* $p \leq .05$ between White and Black.

Table 5a. Consumption of food groups by all teenagers for meals and snacks (Food Guide Pyramid servings), 1 day, CSFII 1989-91[1]

Food group	Breakfast			Lunch			Supper			Snacks		
	Total (n=926)	White (n=735)	Black (n=191)	Total (n=926)	White (n=735)	Black (n=191)	Total (n=926)	White (n=735)	Black (n=191)	Total (n=926)	White (n=735)	Black (n=191)
Grains	1.82	1.81	1.85	1.70*	1.79	1.26	2.23	2.26	2.06	0.61*	0.68	0.27
Vegetables	0.06	0.07	0.01	0.57	0.60	0.44	1.31	1.29	1.38	0.05	0.05	0.02
Fruits	0.34*	0.37	0.21	0.17	0.18	0.15	0.12	0.12	0.14	0.20*	0.23	0.07
Milk	0.67	0.68	0.63	0.52*	0.56	0.37	0.53*	0.61	0.17	0.26	0.27	0.20
Meat	0.17	0.17	0.20	1.09	1.10	1.05	2.35	2.24	2.83	0.10	0.10	0.11

Table 5b. Consumption of food groups by male teenagers for meals and snacks (Food Guide Pyramid servings), 1 day, CSFII 1989-91[1]

Food group	Breakfast			Lunch			Supper			Snacks		
	Total males (n=460)	White (n=381)	Black (n=79)	Total males (n=460)	White (n=381)	Black (n=79)	Total males (n=460)	White (n=381)	Black (n=79)	Total males (n=460)	White (n=381)	Black (n=79)
Grains	2.24	2.22	2.34	2.00	2.05	1.63	2.53	2.54	2.44	0.93*	0.99	0.53
Vegetables	0.10	0.11	0.02	0.62*	0.67	0.26	1.49	1.40	2.14	0.06	0.07	0.04
Fruits	0.43*	0.47	0.15	0.17	0.17	0.11	0.12	0.13	0.04	0.25*	0.28	0.06
Milk	0.79	0.77	0.93	0.58*	0.62	0.32	0.61*	0.67	0.23	0.39*	0.43	0.12
Meat	0.21	0.20	0.27	1.30	1.39	0.76	2.67	2.63	2.95	0.19	0.19	0.21

Table 5c. Consumption of food groups by female teenagers for meals and snacks (Food Guide Pyramid servings), 1 day, CSFII 1989-91[1]

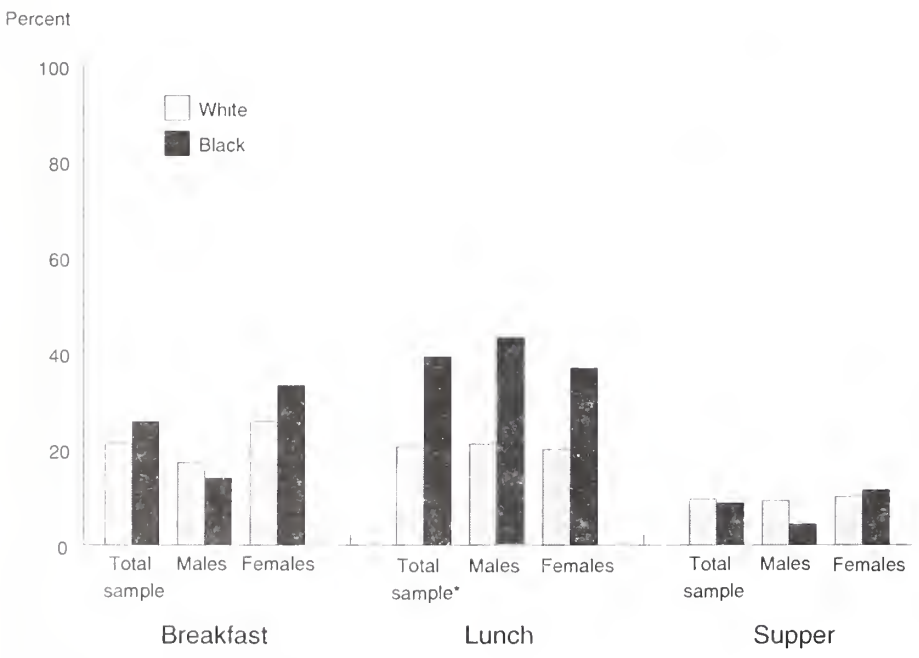
Food group	Breakfast			Lunch			Supper			Snacks		
	Total females (n=466)	White (n=354)	Black (n=112)	Total females (n=466)	White (n=354)	Black (n=112)	Total females (n=466)	White (n=354)	Black (n=112)	Total females (n=466)	White (n=354)	Black (n=112)
Grains	1.38	1.34	1.54	1.38*	1.48	1.04	1.91	1.93	1.83	0.56	0.59	0.49
Vegetables	0.02	0.03	0	0.53	0.52	0.55	1.11	1.17	0.91	0.05*	0.06	0.01
Fruits	0.25	0.26	0.24	0.18	0.18	0.17	0.13	0.11	0.19	0.17*	0.20	0.07
Milk	0.54	0.57	0.45	0.47	0.49	0.40	0.44*	0.53	0.13	0.21	0.18	0.33
Meat	0.14	0.13	0.15	0.87	0.77	1.24	2.00*	1.79	2.76	0.09	0.10	0.07

[1]Weighted data.
* $p \leq .05$ between White and Black.

Nevertheless, the results of this study correspond with previous research. The findings on nutrient consumption are generally consistent with those obtained from the Third National Health and Nutrition Examination Survey (NHANES III), collected between 1988-91. In this study, females were also more likely to have lower-than-recommended intakes of essential vitamins and minerals than males *(1)*. Low intakes of calcium and iron were especially notable. Although nutrient intakes are calculated based on food intake only, given that only one-quarter of teens take vitamin and mineral supplements at least occasionally, it is unlikely that supplementation compensates for low nutrient intakes from food in the majority of teens.

Nutrient intakes below the RDAs do not necessarily mean that intakes are below requirements or that physiological nutrient deficiencies necessarily exist. The RDAs are recommended allowance levels for population groups, not individual requirements, and are set high intentionally to cover the needs of almost everyone in a given sex-age group. Nevertheless, when average intakes are below recommendations, concern that diets are less than optimal for at least some individuals is reasonable. This is particularly true for children and adolescents because nutrient inadequacies during this period of rapid growth may have far-reaching effects. Most notably, low calcium intakes by young females have been associated with lower bone density, a condition predisposing older women to osteoporosis *(25)*.

Figure 3. Meals skipped by teenagers



* $p \leq .05$ between White and Black.

Deficiencies in trace minerals, including iron and zinc, may impair physical growth and/or cognitive performance. Very low levels of iron in the blood can result in iron deficiency anemia, which is characterized by fatigue and weakness. Although anemia is not common, many adolescent females are at risk for symptoms linked to moderate iron deficiencies, including fatigue *(8)* and impaired school performance *(4)*. Deficiencies in zinc in developed countries are also likely to be mild, but some research suggests that even moderate deficiencies may affect growth and/or immune function *(7)*.

Teens' high proportions of energy (calories) from fat, saturated fat, and cholesterol may portend adult problems. Diets high in fat and cholesterol are strongly associated with heart disease in adults, the leading cause of death in the United States. The build-up of atherosclerotic plaque, a precursor of heart disease, has been reported in children and adolescents, suggesting that early diet patterns can set the stage for heart attacks or strokes in later years. High fat intakes may also be associated with obesity. Research tracking health records of young children into adulthood suggests that obesity during adolescence elevates health risks in adulthood, even if the overweight teen slims down in later years. According to the study, teenaged boys who were overweight were twice as likely to have died or developed heart disease by age 70, compared with their slender peers. The heavier boys were also more likely to develop colon and rectal cancer and gout as adults. Teenaged girls who were heavy had greater problems walking, climbing stairs, and lifting heavy objects as older adults, and they were more likely to develop arthritis, compared with their slimmer cohorts *(24)*.

The eating patterns of teens provide insight into possible explanations for the low nutrient intakes identified in this study. For example, in teenage girls' diets the lack of choices from the milk group and dark-green leafy vegetables parallels their low consumption of calcium. Similarly, females' low consumption of grains may be one reason that average iron intakes are below recommendations since grain products contributed 49 percent of iron in the U.S. food supply in 1990 *(14)*. Diets lacking in foods from the bread group, fruits, and vegetables also explain low consumption of dietary fiber by both males and females.

That teens had adequate consumption of vitamin C despite the lack of citrus fruits in their diets may seem surprising. Citrus fruits and juices contributed approximately 24 percent of vitamin C to the U.S. food supply in 1990 *(14)*. However, it appears that teenagers are more likely to consume vitamin C-rich vegetables than fruits. Specifically, potatoes (often in the form of french fries) and tomatoes used in sauces (for example, on pizza) are vitamin C sources that feature prominently in the diets of teenagers.

A review of foods consumed (table 4) illustrates the need for promotions geared to encouraging greater consumption of fruits, vegetables, and foods from the milk group. Fruits stand out as the least favored food group among teens, a finding recently replicated by Cleveland et al. *(6)*. All subgroups in this sample consumed, on average, less than half the servings recommended, and consumption was lowest among Black male youths. Interventions that encourage more consumption of fruits and vegetables, such as "Gimme 5," a curriculum-based program, appear to be successful for children and adolescents *(11,27)*. Among the successful elements of this and other campaigns, the use of social modeling and development of increased behavioral self-efficacy (i.e., increased belief in one's ability to perform a behavior) are techniques likely to translate well to campaigns aimed at teens. Social modeling techniques could associate eating fruits and vegetables with peer or celebrity models. Behavioral self-efficacy could be increased by suggesting easy ways to eat more fruits and vegetables that fit teens' eating patterns—for example, choosing fruit for a snack, since most teens eat snacks daily.

Table 5 and figure 3 also highlight opportunities for intervention. For example, the majority of Black males eat breakfast, but their choices generally leave out fruits. Campaigns directed to this group can focus on making healthy food choices more desirable and easy to accommodate for breakfast.

In contrast, one-third of the Black females in this sample skipped breakfast, a meal that can easily incorporate milk, fruit, and whole grains—good sources of vitamins and minerals often lacking in this population. Breakfast was also the meal most likely to be skipped among White teenaged girls. Reasons for breakfast skipping may include concerns about controlling body weight and time constraints. Messages targeted to Black and White females could address such reasons; for example, emphasizing the benefits of having breakfast and its role in healthy weight control, and providing tips on how to fit a good breakfast into a busy morning.

Similarly, opportunities for increasing consumption of fruits, vegetables, and calcium-rich foods among Black teens could be met by encouraging them to eat lunch. Effective campaigns would require further research with this group to discern reasons for their tendency to skip lunch and appropriate strategies to make healthy lunches appealing.

Another intervention suggested by the findings could focus on introducing teens to lowfat yogurt. Black teens may have a higher incidence of lactose intolerance than other teens, which positions yogurt as a particularly appropriate source of calcium for this group. However, in this study, yogurt was consumed by only 3 percent of White teens on the survey day and was virtually untouched by Black teens. Campaigns that encourage eating yogurt as well as other good sources of calcium can help bridge the gap between recommended and reported consumption of this nutrient.

Conclusions

Frequently, dietary assessment of population groups has focused on intakes of vitamins, minerals, and other dietary components. This level of assessment is important for the identification of nutritional problems; however, it offers little insight into potential solutions. Individuals eat foods, not nutrients; therefore, nutrient intake levels are best considered outcomes of a complex sequence of behaviors including food selection and meal patterns. This study not only identified nutritional problems with teenagers' diets but also identified associated food choices and meal pattern behaviors. Combining this information can enhance our ability to improve dietary status by identifying behaviors associated with less-than-optimal nutrient intakes and suggesting possible strategies for change. It is hoped that these findings will aid in the development of effective interventions to improve the nutritional well-being of adolescents.

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Lower Fat Food Choices Identified Through a Novel Sorting Procedure for CSFII 1989-91 Data

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A unique sorting procedure for the 1989-91 Continuing Survey of Food Intakes by Individuals is described. Following sorting, the extent of adoption of skim milk, lean meats, and fat-modified products and the demographic characteristics of users and nonusers of these fat-reduction strategies were examined using the "Diffusion of Innovations" framework. Americans were in the early stages of adopting these strategies. Exclusive use of skim milk and fat-modified products increased over time while exclusive use of lean meats decreased. Multivariate logistic regression indicated skim milk users were more likely to be older, Caucasian, and have greater incomes than other milk users. Lean meat users were more likely to be female and older than other meat users. Fat-modified product users and multiple strategy users were more likely to be older. To increase use of fat-reduction strategies, nutrition educators should target those most likely to be early adopters and encourage successful users to influence peer food choices.

Certain dietary patterns are associated with increased risk of chronic disease. To reduce the risk, several national nutrition education campaigns promoted lower fat diets to American consumers during the late 1980's and early 1990's *(5,16,19,25,26)*. These projects shared the goal of reducing total fat intake of Americans to 30 percent of total energy or less per day, with the assumption that by doing so, incidence of chronic disease would decrease.

Health professionals translated dietary recommendations into food-based fat-reduction strategies that, in turn, were disseminated to the public. A common approach was to target major food sources of total fat and saturated fat, such as whole milk, high-fat meats, and added fats and oils, with messages to use lower fat versions *(2,6,8,11,21,22, 25,27)*. Skim can be used to replace whole, 2-percent, and 1-percent milks. Lean cuts of meat, prepared with little or no fat, can be used to replace higher

fat meats. Commercial fat-modified and fat-free products, recent additions to the marketplace, can replace the added fats and oils in high-fat foods such as salad dressing, mayonnaise, margarine, ice cream, cheese, and baked goods. In order for any of these choices to impact the incidence of chronic disease, they must be used consistently.

The development and dissemination of innovative messages about lower fat food choices create the potential for their adoption within the population. The impact of these messages on the food choices of Americans can be analyzed using the Diffusion of Innovations concept *(18)*. According to Rogers, an innovation is an idea, practice, or object that is perceived as new by an individual or group, and diffusion is the planned or spontaneous process by which an innovation is communicated through certain channels over time among the members of a social system.

Americans have had the opportunity to interpret and implement common fat-reduction strategies without professional guidance. The extent of exclusive adoption of common fat-reduction strategies by free-living Americans—and who is most likely to use them—is unknown. The Continuing Survey of Food Intakes by Individuals (CSFII) is an ideal data base to use for determining these food choice trends. Traditional analytical procedures for examining nationwide consumption studies sort by single nutrient (e.g., total fat or vitamin C) or by food grouping (e.g., all beef products). In order to determine the impact of using specific lower fat food choices, a different sorting procedure is required. The purpose of this report is (1) to describe the steps involved in developing data subsets using the 1989-91 CSFII food codes *(24)* that represent specific lower fat and higher fat food choices; (2) to describe the extent of adoption of skim milk, lean meats, and fat-modified products and change in adoption rates from 1989-91; and (3) to compare the demographics of those who have and have not adopted these fat-reduction strategies.

Methods

Sorting Procedures

The specific comparison groups used in this study were: Users of skim milk versus users of 1-percent, 2-percent, or whole milk (hereafter referred to as higher fat milks); users of lean meats versus users of medium-fat and high-fat meats (including poultry, beef, pork, lamb, fish, wild game, eggs, and peanut butter as categorized by the American Diabetes and American Dietetics Associations exchange system and hereafter referred to as higher fat meats); and users of fat-modified cheeses, salad dressings, yogurts, cakes, and puddings (hereafter referred to as fat-modified products) versus users of full-fat cheeses, salad dressings, yogurts, cakes, and puddings (hereafter referred to as full-fat products). These products were the only specific food types in the 1989-91 CSFII that included both fat-modified and full-fat versions.

It should be noted that during the years when these surveys were undertaken, there was much confusion regarding label terminology. Standardization of the definition of "lowfat" did not occur until 1994 when final implementation of the Nutrition Labeling and Education Act was required for all processed foods.[1]

In addition, the availability and consumption of 1-percent milk during the survey years were limited. Therefore, 1-percent milk is included in the higher fat milk group. The inclusion of lowfat cheese as a fat-modified product was predicated on the theoretical computer model in which milks were separated from other dairy products and all other commercially available fat-modified foods were placed into one category.

The initial step was to write three hierarchical sets of SAS (Statistical Analysis System) programs to read the 1989-91 CSFII data tapes and create new data subsets. All respondents who completed 3 days of intake data were retained as use of multiple days of intake is preferred over a single record to reduce within-person variability and to allow for more accurate assessment of between-person variability *(7)*. Each year was then searched for food codes representing type of milk used, type of meat used, and type of products used. Cooking methods were considered and mixed meat dishes were included when the description of the food clearly identified the respondents' food choice. Only food codes that clearly identified users and nonusers of the targeted fat-reduction strategies were used; thus, descriptions that included "non-specified type" or "non-specified cooking method" were not included in any group. Those who reported use of some lower fat food choices and some higher fat food choices formed a third comparison group for each analysis and were called "mixed" users.

[1]Fluid 2-percent milk was included among lowfat foods until 1996.

Use of skim milk increased from 6.7 percent in 1989 to 9.7 percent in 1991....

When using food codes to sort data, a person has a new record for each food eaten with key demographic variables repeated for each food record. Therefore, many lines of data represent any individual person. After sorting by food choices, data sets were converted from food code level records to person level records by retaining only one copy of each person's record. Each data set included exclusive users, mixed users, and nonusers for each fat-reduction strategy. A total of nine data sets were created, representing each of the three fat-reduction strategies for each survey year. Demographic data then were added to the data sets by matching ID numbers across record types.

In addition to comparing pure users, mixed users, and nonusers of each fat-reduction strategy, a measure of overall strategy use was developed. This required examination of each person's food choice pattern across strategies. First, the three data sets (milk use, meat use, and product use) were combined into one set for each survey year. A total of 63 possible combinations of food choices for milk, meat, and products existed. These combinations were used to define single strategy users, multiple strategy users, and nonusers.

Single strategy users included: Exclusive use of skim milk but not exclusive use of lean meats or fat-modified products; exclusive use of lean meats but not exclusive use of skim milk or fat-modified products; or exclusive use of fat-modified products but not exclusive use of skim milk or lean meats. Multiple strategy users included: Exclusive use of skim milk and exclusive use of lean meats; exclusive use of skim milk and exclusive use of fat-modified products; exclusive use of lean meats and exclusive use of fat-modified products; or exclusive use of skim milk, lean meats, and fat-modified products. Users of no strategies included those who used 1-percent, 2-percent, or whole milk; those who used medium-fat or high-fat meats; and/or those who used full-fat versions of cheese, yogurt, salad dressing, cake, or pudding.

Demographic Variables

Independent variables were chosen based on their inclusion in the CSFII data base and frequent measurement in Diffusion of Innovations studies *(18)*. Thus, gender, race (White, non-White), education (head of household), household income (percent of poverty), and age served as independent variables for bivariate analyses. Education was categorized as: 11th grade or less, 12th grade (i.e., high school graduate), 13-15 years (i.e., some college), 16 years (i.e., college graduate), and 17 years (i.e., formal schooling beyond college graduation). Income as a percent of poverty was categorized as: 130 percent of poverty or less (130 percent represents the cutoff for food stamps), 131-300 percent of poverty (300 percent represents a conventional cutoff used by USDA for dividing middle income and upper middle income *(4)*), 301-600 percent of poverty (representing upper middle income), and 601 percent or greater (representing upper income). Age was categorized as: 2- to 10-year-olds, 11- to 19-year-olds, 20- to 25-year-olds, 26- to 35-year-olds, 36- to 45-year-olds, 46- to 65-year-olds, and 66- to 100-year-olds.

Statistical Analyses

Chi square analysis was used to determine statistically significant differences in rates of adoption among strategies and in strategy adoption rates across the 3 years. USDA-calculated sampling weights were used to correct for oversampling of low-income groups in the 1989-91 CSFII. Resultant values after weighting then were adjusted to reflect the actual number of cases by dividing the respondents' sampling weight by the mean sampling weight for the group *(13)*.

Bivariate analyses of the relationship of each independent variable to milk use, meat use, product use, and strategy use were completed. Due to insufficient expected frequencies, the age categories 2 to 10 years and 11 to 19 years were combined for 1989 and 1990 analyses of age and strategy use, and the 1990 analysis of age and product use.

Multivariate logistic regression was used to determine the demographic profile most strongly associated with milk use, meat use, product use, and overall strategy use. Interrelationships among demographic characteristics were checked for multicollinearity, resulting in the elimination of education of head of household in the multivariate analyses. Each multivariate analysis compared pure users with mixed and nonusers. For overall strategy use, multiple strategy users were compared with users of one strategy or none.

Unweighted data were used for the logistic regression analyses *(10)*. A p-value of .01, more conservative than standard practice, was used to determine significant relationships in an attempt to compensate for the design effect of this large, complex survey.

Results

Although the separation into specific groupings based on fat level of milk and the above-mentioned food products was relatively easy, division of meat was very complex. Consideration for cut of meat as well as preparation method have to be taken into account when categorizing food codes for meat by fat level. A representative list of food codes used to determine users and nonusers of each fat-reduction strategy is presented in table 1, pp. 40-41. The final data set was composed of all adults who completed 3 days of intake and reported use of some type of milk, some type of meat, or some type of cake, pudding, salad dressing, yogurt, or cheese. The total number of respondents for each strategy and for overall number of strategies by year of survey is presented in figure 1, p. 42.

Demographic profiles of all strategy users and nonusers for each survey year are presented in table 2, p. 43. Significant relationships between year and milk use ($p<0.001$), year and product use ($p<0.001$), year and meat use ($p<0.01$), and year and overall strategy use ($p<0.001$) were identified (figs. 2-5, pp. 44, 45). Use of skim milk increased from 6.7 percent in 1989 to 9.7 percent in 1991, while use of higher fat milks decreased from 69.6 percent to 61.2 percent (fig. 2). Use of fat-modified products increased from 2.1 percent to 2.8 percent. Use of full-fat products increased from 55.8 percent to 59.1 percent and use of no products decreased when comparing the first year with the third year (fig. 3). Use of lean meats decreased from 3.3 percent to 2.9 percent and use of higher fat meats increased from 64.6 percent to 67.4 percent when comparing the first year of the survey with the third year (fig. 4). Overall use of any one strategy increased from 10.5 percent to 12.6 percent. Use of more than one strategy increased slightly from 0.8 percent to 1.4 percent, while use of no fat-reduction strategies decreased from 88.7 percent in 1989 to 86.0 percent in 1991 (fig. 5).

All bivariate relationships of milk use, meat use, product use, or strategy use and each of the independent variables were significant for all 3 years at the $p<0.01$ level except for gender and milk use in the 1990 survey (data not shown). Results of the multivariate logistic regressions indicate that exclusive users of skim milk were significantly more likely to be older, Caucasian, and have greater incomes when compared with higher fat milk and mixed milk users for all 3 years (table 3, p. 46). For 2 of the 3 years, skim milk users were also significantly more likely to be female.

Exclusive users of lean meats were significantly more likely to be older and female when compared with users of higher fat and mixed meats for all 3 years (table 3). For 2 of the 3 years, lean meat users were also significantly more likely to have greater incomes. Users of only fat-modified products were significantly more likely to be older when compared with users of full-fat and mixed products for all 3 years (table 3).

Users of multiple strategies were significantly more likely to be older than users of one or no strategies for all 3 years (table 4, p. 47). For 2 of the 3 years, users of multiple strategies were also significantly more likely to be female when compared with users of one or no strategies. Income expressed as dollars instead of percent of poverty had no impact on the results of the multivariate model.

Table 1. Foods used to sort respondents of the Continuing Survey of Food Intakes by Individuals, 1989-91, into users and nonusers of fat-reduction strategies

Selected foods to define use of	Selected foods to define use of
Skim milk (includes all foods used):	Higher fat milks (includes all foods used):
Milk, cow, fluid, skim or nonfat	Milk, cow, fluid, whole
Milk, low lactose, nonfat	Milk, cow, fluid, whole, low sodium
Milk, dry reconstituted, nonfat	Milk, cow, fluid, whole, fortified with calcium
	Milk, cow, fluid, 1-percent fat, fortified with calcium
	Milk, cow, fluid, lowfat, nonspecific percent fat
	Milk, cow, fluid, 2-percent fat
	Milk, cow, fluid, acidophilus, 1-percent fat
	Milk, cow, fluid, acidophilus, 2-percent fat
	Milk, cow, fluid, 1-percent fat
	Milk, low lactose, 1-percent fat
	Milk, low lactose, 1-percent fat, fortified with calcium
	Milk, cow, fluid, lactose-reduced, 2-percent fat, lactaid
	Milk, dry, reconstituted, whole
	Milk, dry, reconstituted, lowfat
	Milk, cow, fluid, filled with vegetable oil, whole
	Milk, cow, fluid, filled with vegetable oil, lowfat
Fat-modified products (43 food codes actually used):	*Full-fat products (226 food codes actually used):*
Yogurt, plain, nonfat milk	Yogurt, vanilla, lemon, coffee, whole milk
Yogurt, frozen, not chocolate, nonfat milk	Yogurt, frozen, nonspecific flavor, lowfat milk
	Cheese, cheddar or American
Cheese, Swiss, lowfat	Cheese, Swiss
Cheese, cottage, lowfat	Cheese, cottage, dry curd
Cheese, cream, lowfat	Cheese, cream
Cheese, processed, American, lowfat	Cheese, processed, Swiss
Cake, pound, very lowfat, no cholesterol, including Entemann's	Cake, black forest
	Cheesecake
	Cake, German chocolate
	Cake, marble, with icing
Pudding, chocolate, reduced fat, including Jell-O light	Pudding, canned, chocolate
Salad dressing, French type, reduced calorie, fat-free, cholesterol-free	Salad dressing, French type
Salad dressing, low calorie, oil-free	Salad dressing, bacon and tomato

Table 1. Foods used to sort respondents of the Continuing Survey of Food Intakes by Individuals, 1989-91, into users and nonusers of fat-reduction strategies (cont'd)

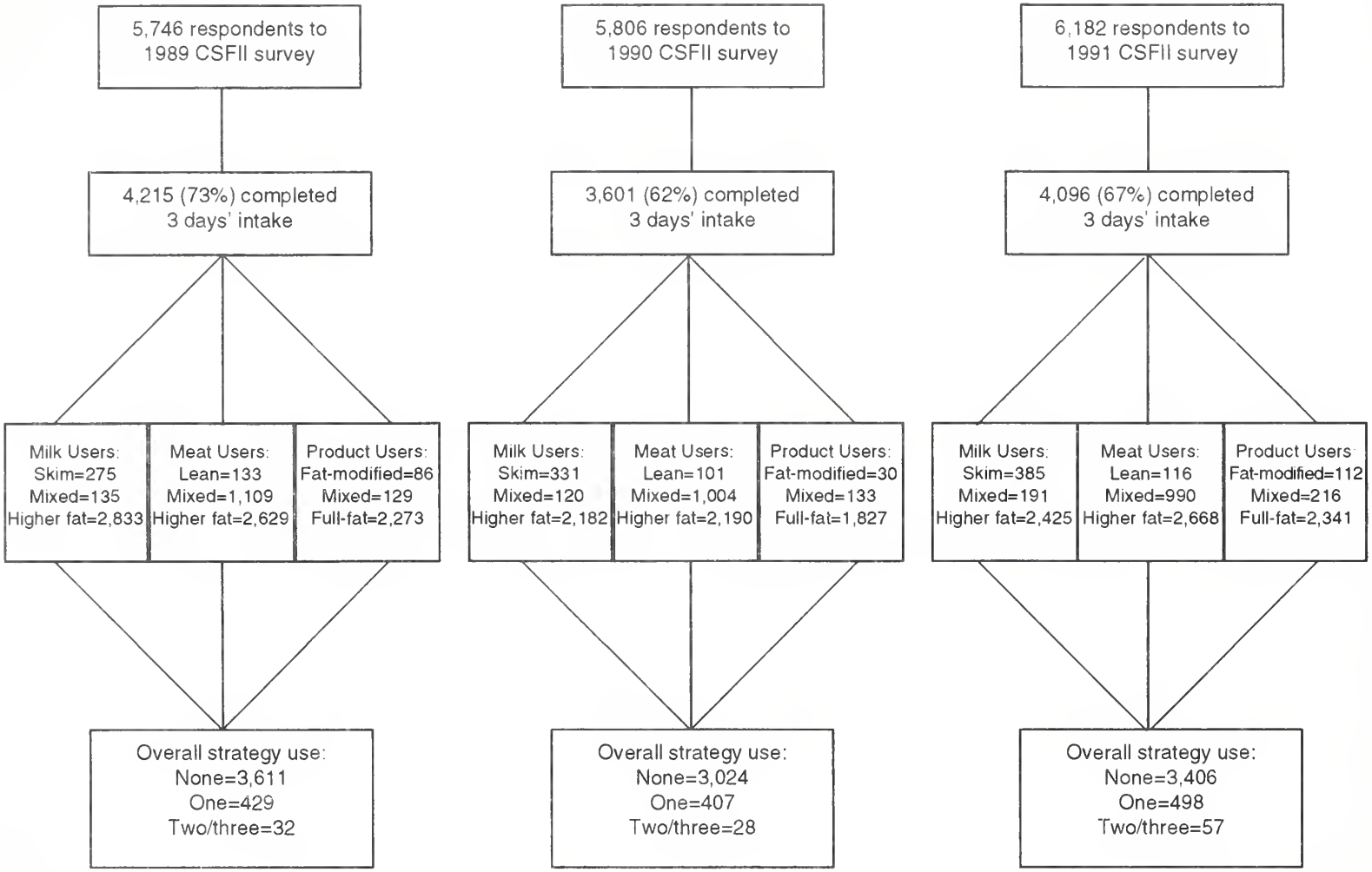
Selected foods to define use of	Selected foods to define use of
Lean meat (185 food codes actually used):	Higher fat meat (709 food codes actually used):
Ham, smoked/cured, cooked, lean only	Beef steak, fried, lean and fat
Pork tenderloin, baked	Beef steak, battered, fried, lean only
Venison, roasted	Ground beef or patty
Chicken breast, broiled, without skin	Pork chop, fried, lean and fat
Turkey, light meat, cooked without skin	Pork spareribs, cooked, lean and fat
Cornish game hen, roasted without skin	Lamb roast, cooked, lean and fat
Turkey ham, sliced, extra lean, prepackaged or deli-sliced	Veal chop, fried, lean and fat
Carp, broiled, baked	Chicken, boneless, breaded, baked/fried, with skin
Cod, steamed, poached	Chicken leg, roasted, with skin
Tuna, fresh, steamed, poached	Chicken thigh, battered, fried, with skin
Clams, steamed, boiled	Turkey, light and dark meat, stewed, with skin
	Turkey nuggets
	Beef liver, breaded, fried
	Frankfurter, beef and pork
	Fish sticks, battered, fried
	Cod, floured, breaded, fried
	Egg salad
	Peanut butter sandwich
	Hamburger, plain, on bun
	Sausage and peppers, no sauce

Discussion

Recent surveys have reported similar, albeit higher, usage rates of lower fat food choices. Of all respondents to the ADA/International Food Information Council survey who said they had made changes with regard to fat in the diet, 36 percent said they were using lowfat foods/less fat, 23 percent reported no/less meat in the diet, 9 percent reported fat-free foods/no fats, 5 percent said they were eating more poultry, and 4 percent reported using skim/lowfat milk *(3)*. Nearly 9 of 10 adult Americans (88 percent) reported regular use of fat-modified food and beverages, including use of lowfat or skim milk by 66 percent, according to a report by the Calorie Control Council where "regular use" was defined as use of a product at least once every 2 weeks *(14)*. It should be emphasized that in this, as well as other surveys, 2-percent and 1-percent milks are combined with skim milk and reported as "lowfat" milk despite the large differences in fat content between each type.

Hence, since the objective of this study was to describe *exclusive* use of fat-reduction strategies, the observed differences in reported usage rates are expected. The sorting procedure developed for this study was rather restrictive. Qualifying as a strategy user required consistent use of the strategy over 3 days. For example, in order to qualify as a lean meat user, a respondent must have reported only lean meats across all 3 days of the survey and no use of medium-fat or higher fat meats. Thus, any record of ground beef across the 3 days automatically removed a respondent from

Figure 1. Total number of respondents in the 1989-91 Continuing Survey of Food Intakes by Individuals who were identified for each type of fat-reduction strategy and overall strategy use by year of survey[1,2,3]



[1]U.S. Department of Agriculture, Human Nutrition Information Service. 1992-94. Nationwide Food Consumption Survey, Continuing Survey of Food Intakes by Individuals: 1989-91. Study No. 09010-073.
[2]Frequencies were weighted to correct for oversampling of low-income households.
[3]Numbers reflect usable 3-day intake records.

Table 2. Demographic profile of all strategy users and nonusers by year of Continuing Survey of Food Intakes by Individuals[1]

Characteristic	1989		1990		1991	
	N	Percent	N	Percent	N	Percent
Gender						
Male	1,961	48.2	1,834	53.0	1,853	46.8
Female	2,110	51.8	1,625	47.0	2,108	53.2
Age (years)						
2 - 10	612	15.0	521	15.1	580	14.6
11 - 19	509	12.5	455	13.2	505	12.7
20 - 25	374	9.2	292	8.5	363	9.2
26 - 35	735	18.1	637	18.4	658	16.6
36 - 45	588	14.4	504	14.6	615	15.5
46 - 65	774	19.1	662	19.1	788	19.9
66 - 100	480	11.8	387	11.2	452	11.4
Education (head of household)						
11th grade or less	883	21.7	668	19.3	765	19.6
12th grade	1,320	32.5	1,078	31.2	1,102	28.2
Some college	825	20.3	718	20.8	895	22.9
College graduate	497	12.2	529	15.3	578	14.8
Graduate school	542	13.3	461	13.4	562	14.4
Income (percent of poverty)						
130 or less	697	17.3	590	17.1	703	17.7
131 - 300	1,279	31.7	1,077	31.3	1,276	32.2
301 - 600	1,432	35.5	1,365	39.7	1,474	37.2
601 or more	630	15.6	409	11.9	507	12.8
Race						
White	3,137	77.1	2,698	78.0	3,094	78.1
Non-White	934	22.9	760	22.0	867	21.9

[1]Frequencies were weighted to correct for oversampling of low-income households.

the lean meats group. A single report of skim milk during the 3 survey days would classify a person as a skim milk user as would consumption of skim milk at every meal for 3 days; however, use of skim milk at most meals with one report of lower fat milk would classify a person as a mixed-milk user.

This restrictive sorting procedure may provide insight into recent questions regarding the use of fat-modified products and their impact on chronic disease, in particular obesity *(1)*. In order for an innovation to begin rapidly diffusing throughout a population and to affect incidence rates, according to Rogers, it must reach an adoption rate between 10 and 25 percent *(18)*. Demographic characteristics of early adopters of these fat-reduction strategies are congruent with those predicted by Diffusion of Innovations theory that consistently predicts high levels of education and income for the earliest adopters of an innovation *(18)*. Education and income were significantly greater for exclusive

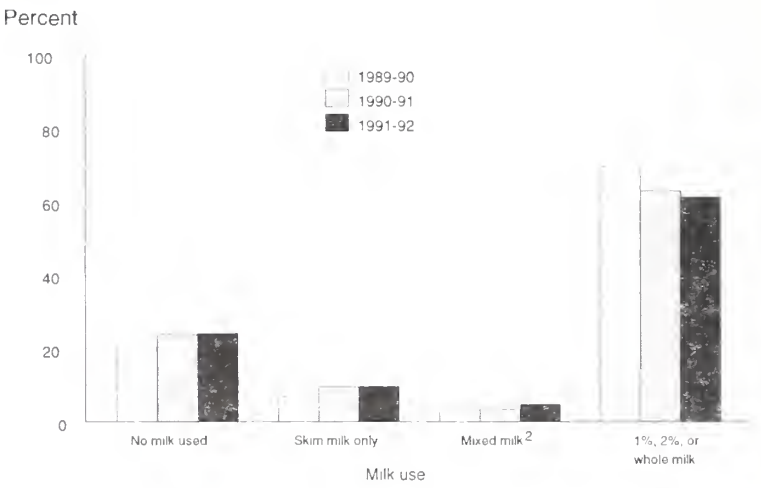
users of each fat-reduction strategy and for multiple strategy users. Previous studies have reported a relationship between education or income and use of lower fat food choices *(12,17,20,23)*. Income was a significant factor in predicting use of skim milk and use of lean meats in the multivariate models.

There has been inconsistent evidence about the relationship of age and innovativeness across Diffusion of Innovations studies *(18)*. In this study, multivariate analyses identified age as a positive predictive variable for each fat-reduction strategy as well as for users of multiple fat-reduction strategies. Previous studies have reported increased use of lower fat diets with advancing age, suggesting older Americans may be a highly motivated group to target.

Generalizations about race and innovativeness or gender and innovativeness have not been made by Rogers *(18)*. Societal pressures on American women for thinness suggest that females may be more likely than males to use fat-reduction strategies. In fact, results of a 1993 survey showed women were more likely than men to report making a change in their diet with regard to fat *(3)*. In this study, being female was a positive predictor of use of skim milk and use of lean meats when included in multivariate models.

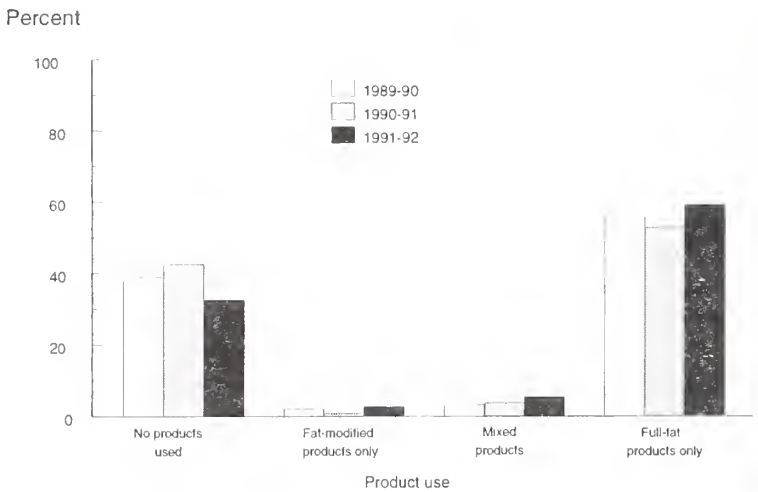
Differences in adoption rates can occur for different innovations within a population, which was the case for the various fat-reduction strategies investigated in this study. Use of skim milk in place of higher fat milks consistently increased across survey years, as use of fat-modified products increased slightly. It will be interesting to follow changes in the type of milk consumed as the availability of 1-percent milk increases and consumers

Figure 2. Comparison of milk use by year using 3-day records of participants in the 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals[1]



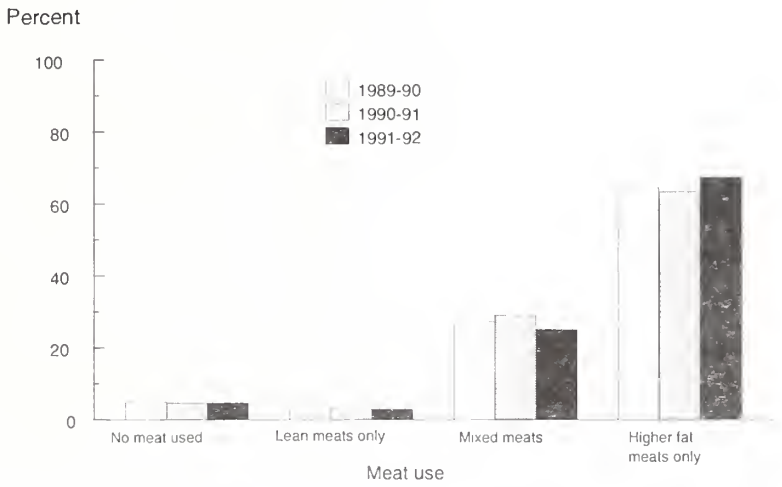
[1]Weighted Chi-square analysis, $p < 0.001$, df=6. Frequencies were weighted to correct for oversampling of low-income households.
[2]Mixed milk was defined as mostly skim with at least one use of a higher fat milk.

Figure 3. Comparison of product use by year using 3-day records of participants in the 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals[1,2]



[1]Weighted Chi-square analysis, $p < 0.001$, df=6. Frequencies were weighted to correct for oversampling of low-income households.
[2]Products include cheese, pudding, cake, salad dressing, and yogurt.

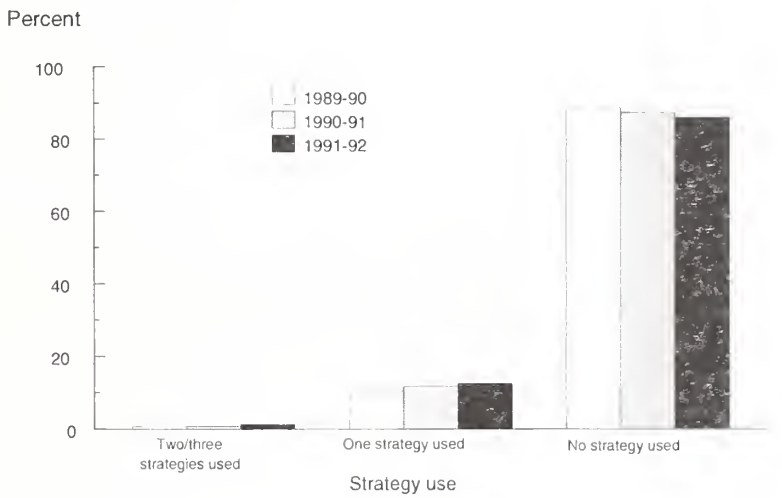
Figure 4. Comparison of meat use by year using 3-day records of participants in the 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals[1]



[1]Weighted Chi-square analysis, $p < 0.001$, df=6. Frequencies were weighted to correct for oversampling of low-income households.

Income was a significant factor in predicting use of skim milk and use of lean meats in the multivariate models.

Figure 5. Comparison of fat reduction strategy by year using 3-day records of participants in the 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals[1,2]



[1]Weighted Chi-square analysis, $p < 0.001$, df=6. Frequencies were weighted to correct for oversampling of low-income households.
[2]Strategies include: Use of skim milk instead of 1-percent, 2-percent, or whole milk; use of lean meats instead of higher fat meats; and/or use of fat-modified products instead of full-fat products.

Table 3. Relationship of age, race, income, and gender on food choice for participants in the 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals[1]

Survey year and characteristic	Skim vs. mixed and higher fat milks			Lean vs. mixed and higher fat meats[2]			Fat-modified vs. mixed and full-fat products[3]		
	Beta	Odds ratio	p value	Beta	Odds ratio	p value	Beta	Odds ratio	p value
1989									
Age	0.0234	1.027	0.0001	0.0213	1.021	0.0001	0.0161	1.016	0.0047
Being non-White	–1.0188	0.361	0.0001	–0.1104	0.895	NS	–1.7375	0.176	0.0037
Income (percent poverty)	0.0007	1.001	0.0028	0.0014	1.001	0.0001	0.0009	1.001	NS
Being female	0.3914	1.479	0.0071	0.7549	2.127	0.0002	0.7229	2.061	NS
	Pseudo R^2=0.070 X^2=124.1, df=4, p<0.0001			Pseudo R^2=0.064 X^2=73.4, df=4, p<0.0001			Pseudo R^2=0.065 X^2=40.7, df=4, p<0.0001		
1990									
Age	0.0149	1.015	0.0001	0.0173	1.017	0.0001	0.0193	1.019	0.0045
Being non-White	–1.1321	0.322	0.0001	–0.5471	0.579	NS	–0.6934	0.501	NS
Income (percent poverty)	0.0019	1.002	0.0001	0.0008	1.001	NS	0.0001	1.001	NS
Being female	–0.3996	0.671	0.0043	–0.6273	0.534	0.0037	–0.1951	0.823	NS
	Pseudo R^2=0.085 X^2=154.1, df=4, p<0.0001			Pseudo R^2=0.040 X^2=38.8, df=4, p<0.0001			Pseudo R^2=0.028 X^2=12.7, df=4, p<0.0127		
1991									
Age	0.0193	1.019	0.0001	0.0147	1.015	0.0003	0.0172	1.017	0.0001
Being non-White	–1.0791	0.34	0.0001	–0.9695	0.314	0.0021	–0.5693	0.566	NS
Income (percent poverty)	0.0009	1.001	0.0001	0.0008	1.001	0.0087	0.0011	1.001	0.0025
Being female	0.2607	1.298	NS	0.5887	1.802	0.0041	0.1623	1.176	NS
	Pseudo R^2=0.063 X^2=127.5, df=4, p<0.0001			Pseudo R^2=0.046 X^2=48.2, df=4, p<0.0001			Pseudo R^2=0.036 X^2=26.9, df=4, p<0.0001		

[1]Multivariate logistic regression using Statistical Analysis System. Relationships were tested for significance at the $p < 0.01$ level.
[2]Lean meats as defined by the American Diabetic Association (ADA) Exchange List for Meal Planning, 1989. Higher fat meats included medium-fat and high-fat meats as defined by the ADA Exchange List for Meal Planning, 1989.
[3]Products included: Cheese, yogurt, salad dressing, cake, and pudding.

become aware of the differences in fat content of the various "lower fat" milks. The decreased use of lean meats may reflect rejection of this innovative strategy. Indeed, participants in several studies have reported difficulty in reducing consumption of higher fat meats *(9,11,15)*. Therefore, exclusive use of lean meats may never be widespread among Americans. It is important to note that use of any fat-reduction strategy increased consistently and use of no fat-reduction strategies decreased consistently during this period. However, at the population level, it appears that current adoption of dietary changes is small and incremental, not sweeping and dramatic.

Characteristics commonly measured in Diffusion of Innovations studies but not included in the CSFII data base may be powerful predictors of adoption of lower fat food choices. Such factors

Table 4. Relationship of age, race, income, and gender on strategy use for participants in the 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals[1,2]

Survey year and characteristic	Two/three strategies vs. one or none		
	Beta	Odds ratio	p value
1989			
Age	0.0332	1.034	0.0001
Being non-White	–0.4041	0.668	NS
Income (percent poverty)	0.0009	1.001	NS
Being female	1.2043	3.334	0.0083
	Pseudo R^2=0.088		
	X^2=33.8, df=4, p<0.0001		
1990			
Age	0.0277	1.028	0.0017
Being non-White	–1.0494	0.351	NS
Income (percent poverty)	0.0012	1.001	NS
Being female	–0.8488	0.428	NS
	Pseudo R^2=0.073		
	X^2=23.8, df=4, p<0.0001		
1991			
Age	0.0276	1.028	0.0001
Being non-White	–1.2776	0.279	NS
Income (percent poverty)	0.0009	1.001	NS
Being female	1.0563	2.876	0.0053
	Pseudo R^2=0.087		
	X^2=41.4, df=4, p<0.0001		

[1]Multivariate logistic regression using Statistical Analysis System. Relationships were tested for significance at the $p < 0.01$ level.
[2]Strategies include: Use of skim milk instead of 1-percent, 2-percent, or whole milk; use of lean meats instead of higher fat meats; and/or use of fat-modified cheese, yogurt, salad dressing, cake, or pudding instead of full-fat versions of these products.

include literacy, social mobility, attitude toward credit, occupational prestige, and being technology-oriented *(18)*. Linkage of the Diet and Health Knowledge Survey to the data sets created by the novel procedure described in this study may provide additional insights.

Finally, future studies looking more closely at the mixed users group might reveal environmental or personal barriers to exclusive use of the various strategies. This might be particularly true for those persons who consume most of their foods away from home.

The observed low rates of exclusive use of skim milk, lean meats, and fat-modified products highlight the need for continued nutrition education efforts. The process of translating health-related research findings into widespread behavior change, a classic example of the Diffusion of Innovations process, suggests mass media channels are more important than interpersonal contact for earlier adopters whereas later adopters require direct, interpersonal contact. Therefore, the focus of current persuasion efforts may need to be redirected. Since the majority of people are influenced by personal contact with early adopters, health professionals should consider engaging current users of fat-reduction strategies to influence peer food choices. The challenge is to target those segments of the population most likely to adopt lower fat food choices and assist early adopters with disseminating their success.

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Role of Breakfast in the American Diet by Income Group

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"Breakfast! That's one of my seven favorite meals of the day"

— Winnie the Pooh
(*in* Good-Bye Mr. Pooh)

Breakfast is an important meal. A study by Morgan et al. *(3)* showed that omission of breakfast had a significant negative nutritional impact, especially on women, and consumption of ready-to-eat cereals at breakfast increased the mean daily intakes of otherwise underconsumed nutrients and was associated with lower intakes of fat and cholesterol. Saldanha *(4)*, using the U.S. Department of Agriculture's (USDA) 1977-78 and 1987-88 Nationwide Food Consumption Survey data, found that, in children, eating breakfast contributed to meeting the daily fiber recommendation, and ready-to-eat cereals were the main contributors to fiber intake. Foods such as orange juice, white bread, and ready-to-eat cereals that are generally consumed more at breakfast than at other meals are the major food sources of folate *(5)*.[1]

Haines et al. *(2)*, in their study on trends in breakfast consumption of U.S. adults, found that breakfast consumption among adults declined from about 86 percent in 1965 to about 75 percent in 1991. Higher income, education beyond high school, and residence in the South were positively associated with an increased probability of eating breakfast. This study examines the role of breakfast in the diets of Americans at three different income levels expressed as a percent of poverty and the kinds of foods individuals at these income groups choose to have for breakfast.

Method

Data from USDA's 1994 Continuing Survey of Food Intakes by Individuals (CSFII 1994) were used for the study. All individuals, except breastfed children, with complete food intake records on day 1 of the survey were placed into three groups based on their household income. Group 1 (N=1,563) had income below 131 percent of the poverty level; group 2 (N=1,854) had income between 131 and 299 percent of the poverty level; and group 3 (N=2,123) had income 300 percent and above the poverty level. The analysis included the 754 individuals who did not eat breakfast. Mean intake of foods, nutrients, and Food Guide Pyramid servings of foods were computed using the SPSS-X (release 6.1) software package. Day 1 full sample weights were used in the analysis.

[1]For detailed information on the nutrient contribution of breakfast for various age/sex groups, see Cleveland et al. *(1)*.

Results

The analysis showed that 85 percent of Americans reported having breakfast, with 18 percent in group 1, 16 percent in group 2, and 13 percent in group 3 not having breakfast. The mean intake of foods and food guide servings are presented in table 1 and table 2, respectively. Breakfast supplied about 20 percent of the day's total grain products for all income groups. Ready-to-eat cereal consumption increased as income level increased, and accounted for 20 to 25 percent of the total grain products consumed at breakfast. Cooked oatmeal was the single grain-based food most consumed by all three groups. Bread was the next highest food consumed, but its consumption decreased as income level increased. Group 1 consumed three times more cooked grits and cooked cream of wheat than the other groups. Bagels, pancakes, and waffles were other popular grain-based breakfast foods. Doughnut consumption at breakfast was lower than that for any of the above-mentioned foods.

The percent contribution of breakfast to the day's vegetable intake was small (less than 5 percent). Potatoes—hash browns, home fries, and stuffed baked—

Table 1. Mean intakes of food groups per individual in a day, by income, 1 day, CSFII 1994

Food groups	Income level expressed as a percent of poverty					
	Under 131		131-299		300 and over	
	All day	Breakfast	All day	Breakfast	All day	Breakfast
	Grams					
Total grain products	292.4	57.5	290.6	59.8	309.0	58.9
Total vegetables	147.4	7.8	184.2	5.2	202.8	6.7
Total fruits	149.7	53.9	161.6	57.9	186.7	74.1
Total milk and milk products	276.4	98.3	274.0	98.1	278.8	99.8
Total meat, poultry, and fish	188.1	12.4	188.0	8.1	201.8	7.7
Eggs	21.6	16.5	17.1	13.0	15.6	10.1
Total sugars and sweets	20.2	5.5	25.8	6.0	17.3	5.4
Total fats and oils	8.7	1.8	13.5	2.1	24.9	2.2
Total beverages	773.3	124.4	916.7	163.4	1004.4	188.2

Table 2. Mean intakes of pyramid food group servings per individual in a day, by income, 1 day, CSFII 1994

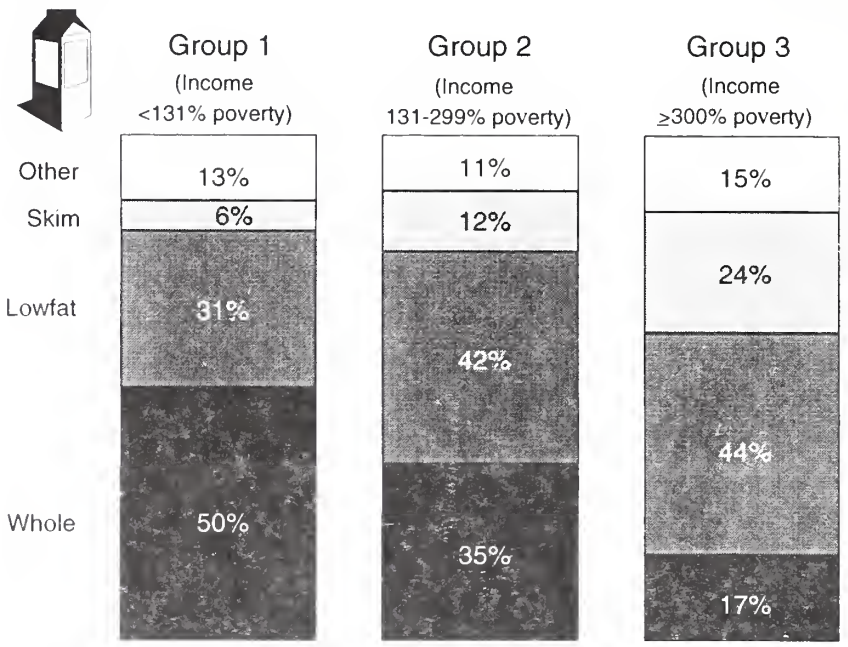
Food groups	Income level expressed as a percent of poverty					
	Under 131		131-299		300 and over	
	All day	Breakfast	All day	Breakfast	All day	Breakfast
Grain	6.06	1.38	6.30	1.41	6.97	1.50
Vegetable	2.38	0.11	2.81	0.08	3.16	0.08
Fruit	1.30	0.39	1.51	0.43	1.81	0.57
Milk	1.70	0.49	1.79	0.50	1.87	0.51
Meat (includes meat alternates)	2.09	0.25	2.09	0.18	2.11	0.16

provided about 65 percent of the total vegetables at breakfast. Tomato products such as tomato juice, catsup, salsa, and raw tomatoes were the next most consumed vegetables.

Breakfast supplied 36 to 40 percent of the day's total fruits by weight and about 30 percent of the day's fruit servings. Fruit intake increased as income level increased. At breakfast, group 3 consumed much higher amounts of fruit than did the other two groups. Oranges and orange juice combined were the most consumed foods in the fruit group. The percent contribution of orange juice to fruit group consumption decreased as income levels increased: from 63 percent for group 1 and 58 percent for group 2 to 53 percent for group 3. The next most popular fruit was bananas, with mean intakes that varied from 9 to 10.5 percent among the three groups. Group 1 consumed most of the fruit group in the form of juices such as orange juice, apple juice, grape juice, and fruit juice blends, with less than 15 percent as fruits such as bananas, grapefruit, apples, and oranges. Fruit juices accounted for only 70 and 65 percent of fruit intakes for group 2 and group 3, respectively. Group 3 consumed more cantaloupes and strawberries than the other two groups.

There was no difference among the groups in the amount of total milk products consumed at breakfast or for the whole day. About one-third of the day's milk servings came from breakfast for all three groups. However, the choice of foods within this food group was different among the three groups (see figure). At breakfast, group 1 had about 50 percent of the total milk products as whole milk, 31 percent as lowfat milk, and 6 percent as skim milk; group 2 had 35 percent as whole milk, 42 percent as lowfat milk, and 12 percent as skim milk; and group 3 had 17 percent as whole milk, 44 percent as lowfat milk, and 24 percent as skim milk. Group 3 also had a higher amount of milk-based breakfast drinks than the others.

Consumption of total milk products at breakfast by income group



The total meat, poultry, and fish intakes from breakfast was very small. Breakfast supplied about 8 to 12 percent of the day's meat servings. Sausage, bacon, ham, and frankfurters were the most common breakfast meats. Egg consumption decreased as income level increased. Most of the day's eggs were consumed at breakfast.

White sugar, maple syrup and other pancake syrups, jellies, jams, and honey were the sugars and sweets; and butter, margarine, cream substitutes, and margarine-like spreads were the fats reported consumed at breakfast. From 16 to 19 percent of total beverages, excluding fruit juices and milk products, for the day were consumed at breakfast. Coffee was the most popular beverage among all three groups, accounting for 70 to 80 percent of beverages at breakfast.

Mean intakes of energy and nutrients from breakfast and the total diet for the day, for the three income levels, are shown in table 3. Breakfast provided less than 20 percent of total calories, fat, protein, carbohydrate, fiber, vitamin A, zinc, and copper and 24 to 35 percent of vitamin C, folate, calcium, and iron for all three income groups. Compared with the other two groups, group 3 had lower intakes of total fat, saturated fat, and cholesterol and higher intakes of carbohydrate, fiber, vitamin A, vitamin C, folate, magnesium, iron, and potassium at breakfast.

Table 3. Mean intakes of energy and nutrients per individual in a day, by income, 1 day, CSFII 1994

Food groups	Income level expressed as a percent of poverty					
	Under 131		131-299		300 and over	
	All day	Breakfast	All day	Breakfast	All day	Breakfast
Energy (kcal)	1861	348	1960	340	2053	338
Protein (g)	72.3	12.3	74.4	11.2	77.7	11.3
Total fat (g)	70.9	12.7	73.2	11.1	76.2	10.4
Saturated fat (g)	25.0	4.8	25.2	4.0	25.8	3.8
Carbohydrate (g)	230.8	47.4	249.6	50.3	260.4	51.6
Dietary fiber (g)	13.0	2.4	14.7	2.5	16.1	3.0
Cholesterol (mg)	277	89	257	69	248.8	56
Vitamin A (IU)	5088	885	5804	1039	7092	1166
Vitamin C (mg)	96	26.5	94.4	26.0	104.2	30.9
Folate (μg)	229	78.6	253.7	83.2	274.8	93.9
Calcium (mg)	756	198	787	190	822	195
Magnesium (mg)	236	52	256	56	282	63
Iron (mg)	13.5	3.8	14.8	4.3	15.9	4.7
Zinc (mg)	10.1	1.9	11.1	2.0	11.3	2.2
Copper (mg)	1.1	0.2	1.2	0.2	1.3	0.2
Potassium (mg)	2357	483	2541	499	2771	571

Grains, milk, and fruits were the top three sources of breakfast calories for groups 2 and 3, while grains, milk, and meat products were the top three for group 1. Milk products provided the highest amount of fat at breakfast for those in group 1, whereas grain products provided the most fat for those in the other two groups. The three groups did not differ in the amounts of grain products consumed at breakfast, but the grain group supplied much higher amounts of vitamin A, folate, iron, and zinc to the diets of individuals in groups 2 and 3 than in group 1. Group 3 received more potassium from the fruit group than did the others. Milk products provided the highest amount of calcium at breakfast for all three groups, followed by grain products.

Discussion

In 1994, 85 percent of Americans ate breakfast. The percentage of individuals who ate breakfast increased as income increased. Food choices differed among income groups. At higher income levels, people ate more ready-to-eat cereals, fruits, and fruit juices and had less eggs and meat products such as sausage, bacon, and frankfurters at breakfast. They also preferred lowfat or skim milk to whole milk. They included a variety of fruits such as bananas, oranges, melons, grapefruits, strawberries, and apples along with fruit juices. Because of higher intakes of ready-to-eat cereals and fruits, the breakfasts of higher income individuals were higher in folate, vitamin A, iron, zinc, magnesium, and potassium, compared with those of lower income individuals.

At lower income levels, individuals consumed more cooked grain products and bread than ready-to-eat cereals and more fruit juices than fruits. They consumed more eggs, meat products, and whole milk and less lowfat and skim milk than others. It is possible that they are unable to afford relatively more expensive foods such as fresh fruit and ready-to-eat cereals. However, individuals in the lower income groups may improve their diets by using lowfat or skim milk instead of whole milk.

Breakfast is a nutrient dense meal in the diets of all income groups since it provides less than one-fifth of the day's total energy but about one-fourth of nutrients such as vitamin C, folate, calcium, and iron.

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Social Security and Earnings of Male Immigrants

Immigration, along with fertility and mortality, affects long-range predictions of Social Security's financial viability. Since the end of World War II, and particularly since the 1960's, there has been a substantial increase in immigration. U.S. Immigration and Naturalization Service statistics on permanent visas granted indicate:

Year	Number of visas (millions)
1941 - 1950	1.0
1951 - 1960	2.5
1961 - 1970	3.3
1971 - 1980	4.5
1981 - 1990	7.3
1991 - 2000*	10.0

*Estimated number

The share of the U.S. work force that is foreign-born increased from 6.4 percent in 1980 to 9.7 percent in 1994. More than one-quarter of new labor market entrants between 1980 and 1988 were immigrants.

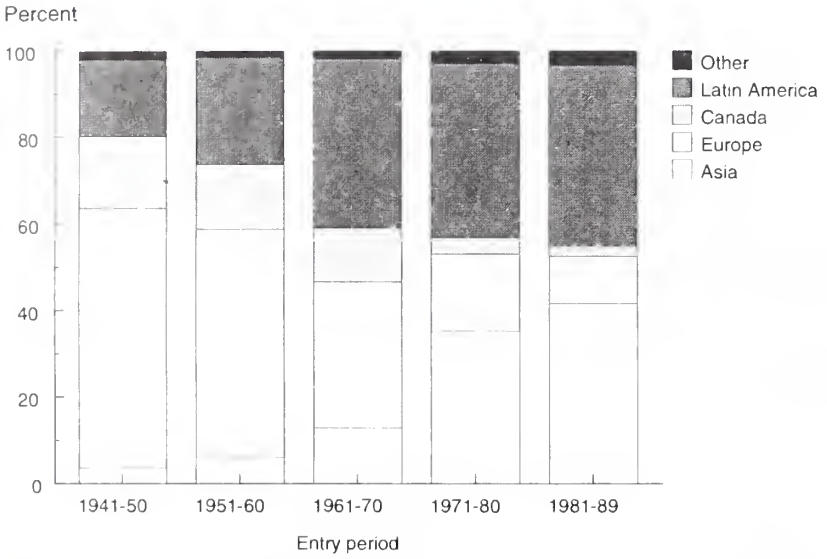
Immigration is increasing in importance as a source of population growth. In 1992, about one-third of the growth in population was caused by net immigration. There have also been changes in the composition of immigration (see figure). Changes in immigrant composition affect earnings patterns and associated contributions to the Social Security system. To understand how immigration relates to the financial status of Old-Age, Survivors, and Disability Insurance (OASDI) programs, information comparing earnings and benefits for immigrants and native-born Americans is needed. This study provides information on immigrant earnings profiles—specifically, relative entry earnings and earnings growth of immigrants.

Immigration Policy

A major change in U.S. admissions policy occurred in 1965. Prior to 1965, U.S. immigration policy was dominated by the national origin system that allocated visas to countries according to the national origin composition of the U.S. population in 1920. This system greatly favored immigration from Western European countries; also, there were laws that inhibited almost all immigration from Asia. In 1965, this policy was replaced by a system that made family reunification the key determinant. Also, persons would be allowed to enter the United States on the basis of employer requests for needed occupational skills.

The restrictive nature of the pre-1965 admission policy meant that post-1965 migrants from countries whose immigration had previously been severely restricted generally lacked relatives in the United States and were therefore most likely to immigrate under the employment preference provisions. Thus, initial immigrants were likely to have transferable skills to the U.S. labor market; these immigrants established a base so that relatives with less transferable skills could enter under the family admission categories. Recent immigrants are more likely to be admitted to the United States based on kinship ties rather than on occupational skills. Also, since 1960 there have been increased numbers of illegal immigrants and refugees.

National origin composition of legal immigrant flow: Percent, by immigrant entry period and country of origin



Source: Duleep, H.O. and Regets, M.C., 1996, Social Security and immigrant earnings, Social Security Bulletin 59(2):20-30.

Countries currently dominating U.S. immigration are less economically developed than those that dominated in previous years. Immigrants from these countries have skills that are less transferable to the United States because their formal education and work experience are less applicable to the U.S. economy (compared with those from economically developed countries). Immigrants must adapt their previously acquired human capital to the new labor market, but limited career opportunities in less developed countries may make it worthwhile for individuals to immigrate even if it entails post-migration investment in new skills and schooling. In contrast, their counterparts in economically developed countries (Western Europe) are less likely to find it worthwhile to immigrate. Therefore, in the absence of admission constraints, it is probable that the largest immigrant populations will be from Asia and Central and South America and can be expected to have low entry earnings.

Entry Earnings

Median earnings of recent male immigrants in 1989 were 40.6 percent of the median earnings of native-born males (table 1). Compared with native-born Americans, immigrants have slightly fewer years of education and are younger; even within age and education categories, however, initial earnings of immigrants are lower. Among those ages 25-39 with some college education, male immigrants initially earned only 48.5 percent as much as native-born men.

Changes in Entry Earnings Over Time

It is not surprising that the pre-1965 and post-1965 country-of-origin composition of U.S. immigration changed radically or that there has been a decline in entry earnings, both in real terms and relative to the native born (whose real earnings have also declined since 1969). In 1969, immigrant men who had entered the United States in 1965-70 earned 65 percent of native men's earnings; in contrast, in 1989, men who had entered the country in 1985-90 earned 41 percent of natives' earnings. This relative decline in immigrant entry earnings persists even within age and education categories (table 2).

Earnings Growth of Male Immigrants

The earnings contributions of immigrants to Social Security depends not only on initial earnings but also on earnings growth. If the earnings growth of recent immigrant cohorts relative to natives is the same or lower than that for earlier cohorts, the relative per capita earnings contribution of recent immigrants to Social Security will be substantially less than that of previous immigrant cohorts—who represented a smaller percentage of the work force. However, if earnings growth is inversely associated with entry earnings (low entry earnings associated with high earnings growth), then the impact of the dramatic decline in immigrant entry earnings on Social Security would be significantly lessened.

Table 1. Median entry earnings in 1989 of immigrant men, age 25-54, relative to U.S. born, who entered the United States between 1985 and 1990, by region of origin, age, and education

Region of origin	All	Age and education level			
		25-39 years old; 1-12 years of school	25-39 years old; >12 years of school	40-54 years old; 1-12 years of school	40-54 years old; >12 years of school
All immigrants	0.406	0.529	0.485	0.381	0.500
Asia	0.443	0.589	0.434	0.316	0.439
Central/South America	0.364	0.506	0.447	0.376	0.401
Western Europe	1.010	1.147	0.931	0.845	1.372

Note: Estimates based on the 1990 Census of Population, 5-percent and 1-percent Public Use Samples combined.

Source: Duleep, H.O. and Regets, M.C., 1996, Social Security and immigrant earnings, Social Security Bulletin 59(2):20-30.

Table 2. Median earnings of immigrant men, age 25-54, relative to U.S. born, during their first 5 years in the United States and 10 years later, by immigrant entry cohorts, age, and education

Age and education level	1965-70 cohort		1975-80 cohort		1985-90 cohort
	1969 ratio to U.S. born	1979 ratio to U.S. born	1979 ratio to U.S. born	1989 ratio to U.S. born	1989 ratio to U.S. born
25-54; all education levels	0.653	0.854	0.500	0.839	0.406
25-39; 1-12 years of school	0.631	0.706	0.486	0.750	0.529
25-39; >12 years of school	0.577	0.864	0.463	0.886	0.485
40-54; 1-12 years of school	0.594	0.769	0.417	0.867	0.381
40-54; >12 years of school	0.522	0.720	0.479	0.788	0.500

Source: Duleep, H.O. and Regets, M.C., 1996, Social Security and immigrant earnings, Social Security Bulletin 59(2):20-30.

Using Census data from 1970, 1980, and 1990, earnings of immigrants were examined to provide estimates of immigrant earnings growth relative to that of the native born. For all immigrant males ages 25-54 in the first decennial Census after entry into the United States, about two-thirds of the earnings gap relative to natives was closed in the next 10 years (table 2). A similar pattern was found when comparing earnings over time by age and education. Thus, immigrants have much faster earnings growth rates than U.S.-born workers.

Despite a 23-percent drop in earnings relative to the native born between the 1965-70 and 1975-80 immigrant cohorts, there was very little difference in the relative earnings of each cohort after 10-14 years of U.S. residence because the cohort with lower relative entry earnings had a much larger growth rate. This effect is even more dramatic when separate age and education groups are examined. In each category, the cohort with lower relative earnings surpassed the initially higher earnings immigrant cohort in relative earnings. This strong inverse relationship between relative entry earnings and subsequent relative earnings growth rate is robust, found not only in aggregate numbers but also cross-sectionally across immigrant source countries and across entry cohorts holding the source country constant. Factors that may cause immigrants to have low initial earnings (few transferable skills) also create incentives and opportunities for human capital investment (U.S. training and education), eventually leading to more skilled, higher paying positions.

Conclusion

This study was undertaken in order to project the earnings contributions to the Social Security system made by immigrants. Results indicate that entry earnings of recent immigrants, relative to the native born, are substantially lower than the relative entry earnings of immigrants who entered the United States in 1965-70. However, the relative earnings growth of recent immigrants exceeds that of earlier immigrants. The inverse relationship between relative entry earnings and relative earnings growth is such that after 10-14 years in the United States, the earnings of more recent immigrants (predominantly Asian and Central/South American) relative to the native born equals the relative earnings of earlier immigrants (predominantly Western European).

Source: Duleep, H.O. and Regets, M.C., 1996, Social Security and immigrant earnings, *Social Security Bulletin* 59(2):20-30.

An Experimental Consumer Price Index for the Poor

Each year, price inflation adjustments are made for various Federal, State, and local programs in the United States. In 1994, there were approximately 80 benefit programs that provided cash and noncash aid—primarily to persons with limited incomes. The benefit levels and eligibility guidelines for a substantial number of these programs are adjusted annually for inflation. For example, food stamp levels and poverty guidelines are adjusted using the Consumer Price Index for urban consumers (CPI-U) for food and all items, respectively. Does the CPI-U adequately reflect the trends in relative prices paid by the poor for goods and services? If the poor are faced with a different price inflation, what are the implications for governments providing benefits to these consumers and for the measurement of poverty in general?

The CPI-U measures the average change in prices paid by all urban consumers for a fixed market basket of goods and services. If low income urban consumers have different consumption patterns—for example, spend more of their budget on necessities than do higher income consumers—it is possible that a separate CPI for the poor would better reflect their situation. Other researchers have examined price inflation as experienced by those with lower incomes and concluded that inflation rates for the poor were similar—or, at least, any differences were not statistically significant—to inflation rates for the whole population. This study was undertaken to determine whether an experimental price index for poor consumers would be lower than, higher than, or equal to the current CPI-U.

Within the framework of the CPI program, the only way to construct price indexes for demographic subgroups of the population is to adjust the expenditure weights to represent those groups. So, to empirically compare the effects of price changes on different subgroups within the U.S. urban sample, it must be assumed that the distribution of prices paid for the same items, as well as differences in the quality of items purchased, is the same across population subgroups.

To obtain expenditure weights for the poor, data from the Consumer Expenditure Survey (CE) for 1982-84 and 1992-94 were used. Relative price data were from the Consumer Price Index program for 1984 through 1994. To obtain estimates for the poor population, data from urban consumer units interviewed between January 1982 and December 1984 were used.

Three definitions were used to define poor consumer units:[1] the *income*[2] *poor* who were complete income reporters with income below the poverty threshold for 1982-84 (n=1,542); the *expenditure poor* who had annual expenditures below the poverty threshold (n=1,267); and the *program participant poor* who received supplemental security income, public assistance, job training grants, food stamps, medicaid, or housing assistance (n=1,313).

Table 1 shows the demographic composition of all urban consumer units and each of the poor populations of consumer units. Compared with the all urban population, the poor populations contain a larger percentage of single persons, single parents, Black households, and older and younger households. There are smaller percentages of homeowners and married couples than in the overall population. The majority of reference persons in poor consumer units do not have a high school education.

Although the majority of income poor were also expenditure poor (and vice versa), many consumer units were classified as poor under one of the two definitions—but not the other. Also, there were more income poor with high (greater than 200 percent of the poverty threshold) expenditures (2.3 percent) than there were expenditure poor with high income (0.3 percent). This indicates that in the use of CE Survey data, low expenditures may be a better proxy of resources than low income to identify the poor population.

Three types of price indexes were utilized in creating an experimental consumer price index for the poor. The first is the Laspeyres index—a fixed-weight index that calculates average expenditure shares and price ratios for a sample of households or a subsample based on any chosen demographic characteristics. Because it is a fixed-weight index, the Laspeyres index does not allow for substitution by consumers across goods and services when the relative prices of those goods and services change. Thus, the Laspeyres index represents the upper bound to the true cost-of-living index measure.

The second index is the Paasche index. This index uses current-period expenditure shares as weights so a set of expenditure shares for each successive period in the index series must be estimated.

[1] A consumer unit comprises members of a household who are related or who share at least two of three major expenditures—housing, food, and other expenses.

[2] For this study, income is total cash income before taxes and excludes the cash value of food stamps.

Table 1. Percent distribution of the weighted Consumer Expenditure Survey sample by characteristics, 1982-84

Characteristic	All consumer units (n=11,236)	Income poor (n=1,542)	Expenditure poor (n=1,267)	Program participants (n=1,313)
Type of family				
Married couple, no children	22.1	6.5	5.3	4.7
Married with children	31.3	19.4	13.6	18.5
Other married couples[1]	4.8	6.6	6.2	9.6
Single parent	5.6	15.6	15.7	19.6
Single person	25.6	33.3	41.6	26.0
Other families[2]	10.6	18.6	17.6	21.6
Region				
Northeast	23.4	21.6	21.8	25.5
Midwest	26.1	25.4	25.0	24.9
South	31.9	37.9	39.3	30.2
West	18.6	15.1	13.9	19.4
Program participation[3]				
Food stamps	6.1	39.4	36.7	50.8
Medicaid	5.6	34.5	29.1	45.7
General welfare	3.7	19.8	21.6	32.2
Housing assistance	3.4	20.4	17.3	25.4
Supplemental Security Income	2.9	12.7	14.2	25.4
Characteristics of reference person				
Male	67.5	43.3	37.6	38.7
Black	11.1	25.2	29.4	30.3
Education:				
Less than high school	26.1	52.0	63.7	54.9
High school graduate	30.2	23.9	22.4	26.7
Some college	21.3	15.3	10.3	13.2
College graduate	22.4	8.8	3.6	5.2
Age (years)				
Less than 25	7.0	9.5	12.6	7.8
25 - 44	41.4	35.9	29.7	38.2
45 - 64	30.5	28.1	24.1	27.2
65 or older	21.1	26.5	33.6	26.8

[1]*Other married couples* are married-couple families that include persons other than the couples' own children.
[2]*Other families* include those that do not exactly meet any of the preceding definitions—for example, single-parent families that include persons, other than children, related to the single parent.
[3]Consumer units may receive multiple forms of assistance and therefore can fall into more than one category.

Thus, the Paasche index is less useful for official measures because the time needed to estimate these shares from survey data creates a lag in publishing the current value of the index.

If both the Laspeyres and Paasche indexes are calculated, it is possible to produce an index that is, in theory, a very close approximation to a true cost-of-living index. This third index, Fisher's ideal index, is the geometric mean of the Laspeyres and Paasche indexes. When used as the true benchmark cost-of-living index, Fisher's ideal index can assess the degree of substitution bias inherent in the fixed-weight Laspeyres calculation: the percent difference between the two indexes is the substitution bias.

Table 2 presents the aggregate shares for seven commodity groups for all consumer units and for poor consumer units, for each definition of poverty; these represent the average expenditure shares for the 1982-84 period. As expected, the poor populations have larger shares than the entire sample for items generally considered necessities, such as food and housing, and smaller shares for entertainment and transportation. The table also shows that the expenditure poor have spending patterns that are most dissimilar to that of the entire sample.

Table 3 shows values of the three indexes and the substitution bias in the Laspeyres index based on 1984-94 expenditure shares for each population group. The substitution bias for the income poor and the program participant poor groups appear to be lower than for the expenditure poor and all consumer units.

Table 2. Average expenditure shares over the 1982-84 period, for all consumer units and for poor consumer units, for each definition of poverty

Expenditure category	All consumer units	Income poor	Expenditure poor	Program participants
Food and beverages	18.3	21.0	26.1	24.4
Housing	41.8	44.4	51.0	42.9
Apparel and upkeep	5.7	5.3	4.5	5.5
Transportation	20.6	15.7	8.8	15.2
Medical care	4.7	4.7	4.0	4.7
Entertainment	4.1	3.3	1.6	2.6
Other commodities	4.8	5.6	4.0	4.7

Table 3. Price indexes and substitution bias in Laspeyres index, 1984 and 1994

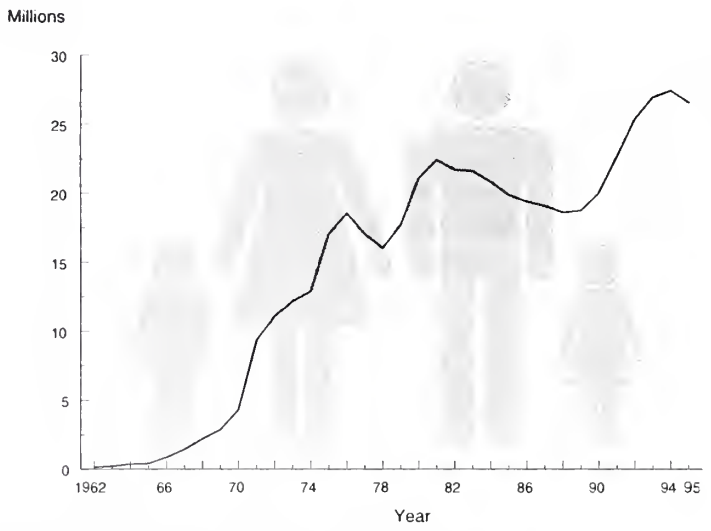
Index and bias	All consumer units	Income poor	Expenditure poor	Program participants
Paasche index	139.5	139.6	139.1	139.6
Fisher ideal index	140.3	140.0	139.8	139.7
Laspeyres index	141.1	140.7	140.6	139.8
Substitutions bias (percent)	1.99	1.75	2.01	.25

The experimental price indexes were used to examine how sensitive the poverty rates for individuals are to different adjustments for inflation. The 1984 official poverty thresholds were inflated to 1992-94, using the Laspeyres index, and compared with the published Census Bureau thresholds for 1992-94. Results show a minimum effect on indexes for the income poor and the expenditure poor when compared with official Census Bureau poverty thresholds. Therefore, the authors conclude that there is very little difference between the experimental consumer price indexes produced for the poor and the corresponding CPI for all consumer units.

Source: Garner, T.I., Johnson, D.S., and Kokosi, M.F., 1996, An experimental consumer price index for the poor, *Monthly Labor Review* 119(9):32-42.

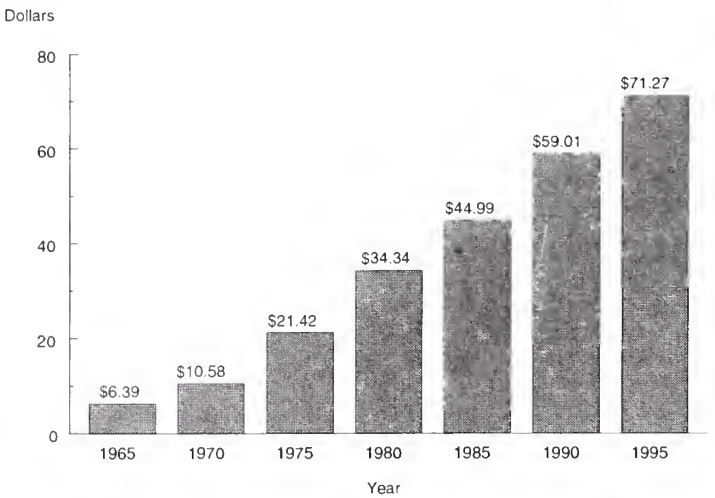
Charts From Federal Data Sources

Number of persons participating in Food Stamp program, FY 1962-95



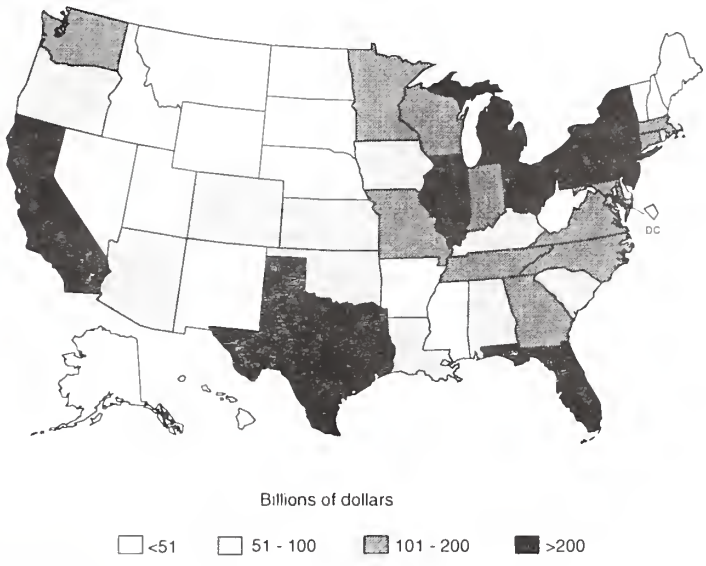
Source: Social Security Bulletin, Annual Statistical Supplement, 1996.

Annual average monthly bonus per person participating in Food Stamp program, selected years



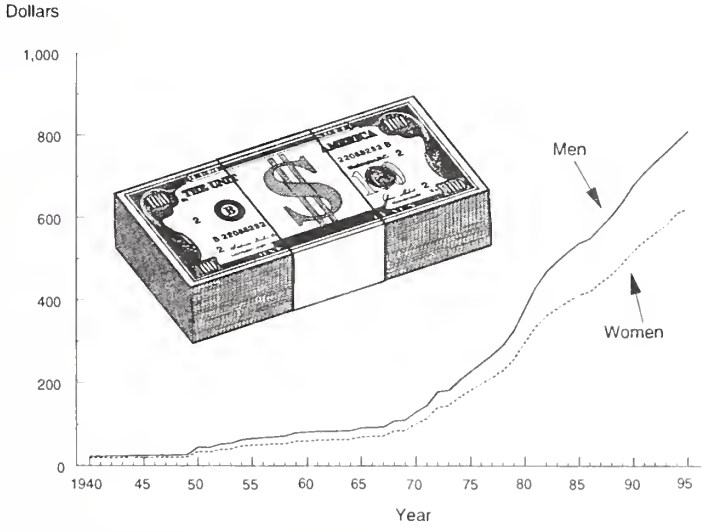
Source: Social Security Bulletin, Annual Statistical Supplement, 1996.

1995 total personal income by State



Source: U.S. Department of Commerce, Economics and Statistics Administration, Survey of Current Business 76(10).60.

OASDI[1] current-pay benefits: Retired workers, by sex, 1940-95



[1] Old Age, Survivors, and Disability Insurance.
Source: Social Security Bulletin, Annual Statistical Supplement, 1996.

Recent Legislation Affecting Families

Public Law 104-331 (enacted October 26, 1996)—the Presidential and Executive Office Accountability Act amends Federal law to make certain laws applicable to the Executive Office of the President, the Executive Residence at the White House, and the official residence of the Vice President (the employing offices).

The Executive Branch, including the President, must comply with civil rights, labor, and employment laws, including (1) the Fair Labor Standards Act of 1938; (2) title VII of the Civil Rights Act of 1964; (3) title I of the Americans with Disabilities Act of 1990; (4) the Age Discrimination in Employment Act of 1967; (5) the Family and Medical Leave Act of 1993; (6) the Occupational Safety and Health Act of 1970; (7) Federal law relating to Federal service labor-management relations; (8) the Employee Polygraph Protection Act of 1988; (9) the Worker Adjustment and Retraining Notification Act; (10) the Rehabilitation Act of 1973; and (11) Federal law relating to veterans' employment and reemployment.

In addition, the law prohibits intimidation or reprisal against any employee making a charge under any of the aforementioned laws.

Public Law 105-6 (enacted March 19, 1997)—the Victim Rights Clarification Act of 1997 permits victims to attend and observe criminal trials; the U.S. district court shall not order any victim of an offense excluded from the trial of a defendant accused of that offense even if they will be participating in a sentencing hearing, making a victim impact statement, or testifying as to the effects of the offense on the victim or victim's family. The law also specifies that the fact that a victim attended or observed the trial shall not be construed to pose a danger of creating unfair prejudice, confusing the issues, or misleading the jury.

Public Law 105-12 (enacted April 30, 1997)—the Assisted Suicide Funding Restriction Act of 1997 clarifies Federal Law with respect to restricting the use of Federal funds in support of assisted suicide. The act prohibits the use of appropriated funds to provide or pay for any item or service or health benefit coverage for the purpose of causing (or assist in causing) the suicide, euthanasia, or mercy killing of any individual.

The law also prohibits the use of appropriated funds for: compelling any person or entity to provide or fund any item, benefit program, or service for such purpose; or asserting or advocating a legal right to cause or assist such actions under provisions of the Developmental Disabilities Assistance and Bill of Rights Act, the Protection and Advocacy for Mentally Ill Individuals Act of 1986, the Rehabilitation Act of 1973, and the Legal Services Corporation Act.

The act also amends the Public Health Service Act to authorize grants and contracts for: (1) research and projects to reduce the rate of suicide among persons with disabilities or terminal or chronic illness; and (2) demonstration projects to reduce restrictions on access to hospice programs or fund home health care services, community living arrangements, and attendant care services.

Journal Abstracts

The following abstracts are reprinted verbatim as they appear in the cited source.

Montgomery, D.L. and Splett, P.L. 1997. Economic benefit of breast-feeding infants enrolled in WIC. ***Journal of the American Dietetic Association*** **97*(4)*:379-385.**

Breast-feeding is known to reduce illness and significantly lower mortality and morbidity rates for infants. This study shows that it is also economically beneficial. Based on savings realized within this study cohort; breast-feeding for only the first 3 months of an infant's life could save approximately $4.0 million in WIC costs nationally. Savings realized by WIC from women who breast-feed can be used to serve more participants and to help finance breast-feeding promotion and support activities.

Neumark-Sztainer, D., Story, M., Dixon, L.B., Resnick, M.D., and Blum, R.W. 1997. Correlates of inadequate consumption of dairy products among adolescents. ***Journal of Nutrition Education*** **29*(1)*:12-20.**

The objective of this study was to identify the sociodemographic, personal, psychosocial, and behavioral correlates of low consumption of dairy products among adolescents. A comprehensive, school-based health behavior survey was administered to 36,284 public school students in grades 7 through 12 in Minnesota. Students self-reported consumption of dairy products and items addressing various dimensions of health. The risk factors for low consumption of dairy foods included being female, nonwhite, and of low socioeconomic status. The psychosocial factors associated with low intake included low weight satisfaction, school grades less than or equal to C, and low family connectedness. Dieting was strongly associated with low consumption of dairy foods, and modest consistent associations were also found with other health-compromising behaviors such as binge eating and substance abuse. Interventions aimed at increased consumption of calcium-rich foods among youth need to address high-risk groups and should include both education and environmental components as part of a comprehensive school-based program. Future research should examine differences in intake patterns of calcium-rich foods and health implications of lower intakes among different ethnic groups.

O'Neill, B. 1996. Baby boomers at mid-life: Financial planning for 2000 and beyond. ***Journal of Family and Consumer Sciences*** **88*(4)*:3-8.**

With the oldest members of the baby boom generation turning 50 in 1996, attention is increasingly being focused on the future financial security of these mid-life adults. Baby boomers born between 1946 and 1964, who will be retiring in the early years of the 21st century, have unique financial concerns due to their large numbers and changes in government and employer retirement benefits. As they have done so previously, this demographic cohort will continue to impact societal norms and institutions and adapt to changing economic conditions. Characteristics and history of the baby boom generation are reviewed, along with predictions for their financial future through retirement and 10 implications for family and consumer sciences professionals.

Read, M., Schutz, H., Bock, M.A., Medeiros, D., Ortiz, M., Raab, C., Sheehan, E.T., and Williams, D. 1996. Vitamin supplementation practices: health/nutrition education implications. ***Journal of Consumer Studies and Home Economics*** **20*(4)*:407-414.**

A sample of 310 supplement users, 216 nonsupplement users and 247 inconsistent (user/nonuser) supplementers were followed for 18 months to examine the consistency of supplementation. Since supplementation is often not required for a healthy diet, factors associated with persistence or stability of supplement use have implications for appropriate health/nutrition education. Consistent supplementation (at least 18 months' duration) was associated ($P<0.01$) with (i) female sex, (ii) health beliefs in the efficacy of supplementation, (iii) seeking health information from physicians, nurses, dietitians and nutritionists, (iv) using periodicals, TV/radio and books for sources of nutrition information, (v) older age, (vi) higher income and (vii) higher levels of education. Nonusers were more likely to attribute health to chance on the Multidimensional Health Locus of Control scale, and inconsistent users were more likely to have experienced a change in employment status, relocation to another town/city and a higher number of 'change' events in the previous 18 months. Based on the characteristics of the consistent supplement user, 'academic controversy' may be an effective educational strategy to employ, if changes in supplementation attitudes and beliefs are desired.

Research and Evaluation Activities in USDA

From the Beltsville Human Nutrition Research Center, Agricultural Research Service (ARS)

New Publication on the Internet

Data comparing food intakes of Americans to recommendations in the U.S. Department of Agriculture's Food Guide Pyramid are presented in a new publication called *Pyramid Servings Data: Results from USDA's 1994 Continuing Survey of Food Intakes by Individuals.* This publication is available only on the Internet.

The Food Guide Pyramid was designed to help Americans choose what and how much to eat to get the nutrients they need without excess calories or fat. The Pyramid specifies numbers of servings to eat from five major food groups (grain, vegetable, fruit, dairy, and meat) and gives advice about fat and added sugars (use sparingly).

The 1994 Continuing Survey of Food Intakes by Individuals (CSFII) provides estimates of what Americans eat and drink based on information from about 5,000 people, 2 years old and over, concerning their food intake on 2 nonconsecutive days. This study uses a new method for converting CSFII data into serving sizes specified by the Pyramid. Also, foods are categorized according to Pyramid criteria. Foods like pizza, soups, and pies are separated into their ingredients before servings are counted.

According to the Pyramid, everyone should eat at least the lowest number of servings within recommended ranges. Except for the dairy group, the number of servings that is right for a person depends on his or her calorie needs. For the dairy group, the recommended number of servings depends on age and, for women, on whether or not they are pregnant or lactating.

Sample diets at three calorie levels are presented by number of servings for each of the five food groups (bread, vegetable, fruit, dairy, and meat) (see table).

Findings show that in 1994, the average diet of Americans 2 years of age and over contained almost 2,000 calories. On average, servings from the fruit, dairy, and meat groups were below recommended ranges, and servings from the grain and vegetable groups were near the bottom of recommended ranges. Calories from fats and sugars exceeded Pyramid recommendations.

Specifically, for the grain group *(recommended Pyramid servings = 6-11)*, about half (51 percent) of Americans consumed at least 6 servings daily. For the vegetable group *(recommended Pyramid servings = 2-4)*, Americans ate an average of 3-1/3 servings daily and white potatoes made up 33 percent of them. For the fruit group *(recommended Pyramid servings = 2-4)*, Americans ate an average of 1-2/3 servings of fruit daily; almost half—48 percent—ate no fruit at all during the 2-day period. For the dairy group *(recommended Pyramid servings = 2-3)*, Americans ate an average of 1-1/2 servings a day with only 23 percent meeting their recommendation; only 12 percent of teenage girls and

Sample diets for a day at three calorie levels

Group	Lower *about* 1,600	Moderate *about* 2,200	Higher *about* 2,800
		Servings	
Bread	6	9	11
Vegetable	3	4	5
Fruit	2	3	4
Dairy	2-3[1]	2-3[1]	2-3[1]
		Ounces	
Meat	5	6	7

[1]Women who are pregnant or lactating, teenagers, and young adults to age 24 need three servings.

14 percent of women 20 years and over met the dairy group recommendation. For the meat group *(recommended Pyramid servings = 2-3),* 52 percent of men but only 25 percent of women met their recommendation. Also, the average fat intake of Americans—33 percent of calories—exceeded the Pyramid recommendation of 30 percent, as did added sugar intake—15 percent of calories (19 teaspoons) and almost double the Pyramid recommendation of 10 teaspoons.

The report includes 11 tables depicting average daily servings from Pyramid food groups and percentages of individuals consuming various numbers of servings from Pyramid food groups.

To access and download, the Internet address is:

<http://www.barc.usda.gov/bhnrc/food survey/home.htm>; select "Releases."

New Data Set Available

Microdata from the 1995 Continuing Survey of Food Intakes by Individuals (CSFII) are now available on both magnetic data tape and CD-ROM. Included are information on food and nutrient intakes by 5,326 individuals who provided at least 1 day of dietary data and 1,966 individuals 20 years of age and over who participated in both the 1995 CSFII and the Diet and Health Knowledge Survey (DHKS).

The data set contains complete documentation needed for using the data, including Statistical Analysis System (SAS) programs to read the data and create system files. Record types incorporate:

- General demographic information
- Food and health-related variables
- Amounts and kinds of foods eaten
- Summaries for about 70 ARS-defined food groups and subgroups
- Intakes of food energy and 29 dietary components
- Diet and health knowledge data from the DHKS

Included on the CD-ROM, but not on the data tape, are the technical support files, "Food Code and Nutrient Data Base for CSFII 1995." Also, the CD-ROM contains a user-interface, the Statistical Export and Tabulation System (SETS), which helps the user browse the data and create data subsets. Some statistical programming skills may be needed to use both the data tape and the CD-ROM.

Both the CD-ROM and the magnetic tape are available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 or (703)487-4650. Please order using the accession number indicated:

- Magnetic data tape: *Accession No. PB97-500771.* Cost $265.
- CD-ROM: *Accession No. PB97-500789.* Cost $65.

From the Center for Nutrition Policy and Promotion (CNPP)

The Center for Nutrition Policy and Promotion announces a new product, *Nutrition Insights,* that is to be issued intermittently. This factsheet will use an analysis of appropriate survey data to respond to primarily "hot topics" related to nutrition that are being discussed in the media. Available on the Internet, *Nutrition Insights* may be accessed at the CNPP web site at:

http://www.usda.gov/fcs/cnpp.htm.

Among the topics developed in 1997 are:

- Is Fruit Juice Dangerous for Children?
- Are All Food Pyramids Created Equal?
- Dietary Guidance on Sodium: Should We Take It With a Grain of Salt?
- Does Alcohol Have a Place in a Healthy Diet?

Each *Nutrition Insights* factsheet is also available as a double-sided handout. Those wishing to be placed on the *Nutrition Insights* mailing list or who wish to receive single copies free of charge should contact CNPP by writing to:

Center for Nutrition Policy
and Promotion, USDA
Office of Public Information
1120 20th Street, NW
Suite 200, North Lobby
Washington, DC 20036

or calling (202) 418-2312.

Table 1. **Estimated annual expenditures* on a child by husband-wife families, overall United States, 1996**

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous†
Before-tax income: Less than $34,700 (Average=$21,600)								
0-2	$5,670	$2,160	$810	$720	$370	$390	$660	$560
3-5	5,780	2,140	900	700	360	370	740	570
6-8	5,900	2,060	1,160	810	400	420	440	610
9-11	5,940	1,860	1,380	880	450	460	270	640
12-14	6,740	2,080	1,450	1,000	750	470	190	800
15-17	6,650	1,680	1,570	1,340	670	500	310	580
Total	$110,040	$35,940	$21,810	$16,350	$9,000	$7,830	$7,830	$11,280
Before-tax income: $34,700 to $58,300 (Average=$46,100)								
0-2	$7,860	$2,930	$960	$1,080	$440	$510	$1,080	$860
3-5	8,060	2,900	1,110	1,050	430	490	1,200	880
6-8	8,130	2,830	1,420	1,170	470	560	770	910
9-11	8,100	2,630	1,670	1,240	520	600	500	940
12-14	8,830	2,840	1,680	1,350	880	610	370	1,100
15-17	8,960	2,440	1,870	1,710	780	640	630	890
Total	$149,820	$49,710	$26,130	$22,800	$10,560	$10,230	$13,650	$16,740
Before-tax income: More than $58,300 (Average=$87,300)								
0-2	$11,680	$4,650	$1,280	$1,510	$580	$580	$1,630	$1,450
3-5	11,910	4,620	1,450	1,480	560	560	1,780	1,460
6-8	11,870	4,550	1,740	1,600	620	640	1,220	1,500
9-11	11,790	4,350	2,030	1,670	670	690	850	1,530
12-14	12,620	4,570	2,130	1,780	1,110	690	650	1,690
15-17	12,930	4,160	2,240	2,160	1,010	730	1,150	1,480
Total	$218,400	$80,700	$32,610	$30,600	$13,650	$11,670	$21,840	$27,330

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

†Miscellaneous expenses include personal care items, entertainment, and reading materials.

Table 2. Estimated annual expenditures* on a child by husband-wife families, urban West,† 1996

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous‡
Before-tax income: Less than $34,400 (Average=$21,500)								
0-2	$6,260	$2,580	$880	$790	$360	$330	$660	$660
3-5	6,390	2,560	970	770	350	310	750	680
6-8	6,550	2,530	1,250	870	390	360	440	710
9-11	6,650	2,380	1,490	940	440	390	270	740
12-14	7,410	2,560	1,560	1,060	740	400	190	900
15-17	7,360	2,200	1,690	1,400	650	420	310	690
Total	$121,860	$44,430	$23,520	$17,490	$8,790	$6,630	$7,860	$13,140
Before-tax income: $34,400 to $57,900 (Average=$45,800)								
0-2	$8,450	$3,320	$1,030	$1,150	$430	$450	$1,100	$970
3-5	8,670	3,300	1,180	1,130	420	430	1,220	990
6-8	8,770	3,260	1,510	1,240	470	490	780	1,020
9-11	8,800	3,120	1,780	1,300	520	520	510	1,050
12-14	9,490	3,300	1,780	1,430	860	530	380	1,210
15-17	9,680	2,930	1,980	1,780	770	560	650	1,010
Total	$161,580	$57,690	$27,780	$24,090	$10,410	$8,940	$13,920	$18,750
Before-tax income: More than $57,900 (Average=$86,700)								
0-2	$12,130	$4,910	$1,330	$1,590	$560	$530	$1,670	$1,540
3-5	12,390	4,890	1,500	1,570	550	500	1,820	1,560
6-8	12,350	4,860	1,810	1,670	600	570	1,250	1,590
9-11	12,330	4,710	2,110	1,740	660	610	870	1,630
12-14	13,130	4,890	2,200	1,860	1,090	630	670	1,790
15-17	13,470	4,530	2,320	2,230	980	650	1,180	1,580
Total	$227,400	$86,370	$33,810	$31,980	$13,320	$10,470	$22,380	$29,070

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

†The Western region consists of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

‡Miscellaneous expenses include personal care items, entertainment, and reading materials.

Table 3. Estimated annual expenditures* on a child by husband-wife families, urban Northeast,† 1996

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous‡
Before-tax income: Less than $34,400 (Average=$21,500)								
0-2	$5,930	$2,590	$910	$600	$390	$370	$530	$540
3-5	6,060	2,570	1,000	580	380	360	610	560
6-8	6,270	2,540	1,280	680	420	410	350	590
9-11	6,410	2,390	1,530	750	470	440	200	630
12-14	7,220	2,570	1,600	870	800	450	140	790
15-17	7,140	2,210	1,730	1,200	710	470	240	580
Total	$117,090	$44,610	$24,150	$14,040	$9,510	$7,500	$6,210	$11,070
Before-tax income: $34,400 to $57,900 (Average=$45,800)								
0-2	$8,080	$3,330	$1,060	$970	$460	$500	$910	$850
3-5	8,280	3,310	1,210	940	450	480	1,020	870
6-8	8,440	3,270	1,540	1,050	490	550	640	900
9-11	8,540	3,130	1,820	1,120	550	580	400	940
12-14	9,280	3,310	1,820	1,240	930	590	290	1,100
15-17	9,390	2,940	2,020	1,590	830	620	500	890
Total	$156,030	$57,870	$28,410	$20,730	$11,130	$9,960	$11,280	$16,650
Before-tax income: More than $57,900 (Average=$86,700)								
0-2	$11,680	$4,920	$1,350	$1,400	$590	$580	$1,420	$1,420
3-5	11,950	4,910	1,530	1,380	580	560	1,550	1,440
6-8	11,990	4,870	1,840	1,490	630	630	1,050	1,480
9-11	12,020	4,730	2,140	1,560	690	680	710	1,510
12-14	12,880	4,900	2,240	1,680	1,160	690	540	1,670
15-17	13,100	4,540	2,360	2,040	1,050	710	940	1,460
Total	$220,860	$86,610	$34,380	$28,650	$14,100	$11,550	$18,630	$26,940

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

†The Northeast region consists of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

‡Miscellaneous expenses include personal care items, entertainment, and reading materials.

Table 4. Estimated annual expenditures* on a child by husband-wife families, urban South,† 1996

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous‡
Before-tax income: Less than $34,900 (Average=$21,800)								
0-2	$5,730	$2,140	$780	$720	$390	$430	$740	$530
3-5	5,870	2,120	880	700	380	410	830	550
6-8	6,000	2,090	1,130	800	430	470	500	580
9-11	6,100	1,940	1,370	870	480	510	310	620
12-14	6,850	2,120	1,430	990	790	520	220	780
15-17	6,820	1,750	1,560	1,330	700	540	370	570
Total	$112,110	$36,480	$21,450	$16,230	$9,510	$8,640	$8,910	$10,890
Before-tax income: $34,900 to $58,700 (Average=$46,400)								
0-2	$7,990	$2,890	$940	$1,080	$470	$570	$1,200	$840
3-5	8,210	2,880	1,090	1,060	450	550	1,320	860
6-8	8,290	2,840	1,400	1,170	500	620	860	900
9-11	8,310	2,690	1,660	1,240	560	660	570	930
12-14	9,000	2,870	1,660	1,360	920	670	430	1,090
15-17	9,200	2,500	1,860	1,710	820	700	730	880
Total	$153,000	$50,010	$25,830	$22,860	$11,160	$11,310	$15,330	$16,500
Before-tax income: More than $58,700 (Average=$87,900)								
0-2	$11,750	$4,520	$1,240	$1,520	$600	$660	$1,790	$1,420
3-5	12,020	4,510	1,410	1,500	590	630	1,940	1,440
6-8	11,970	4,470	1,700	1,600	650	720	1,360	1,470
9-11	11,900	4,320	1,990	1,670	700	760	950	1,510
12-14	12,710	4,500	2,080	1,790	1,150	770	750	1,670
15-17	13,130	4,130	2,210	2,160	1,050	800	1,320	1,460
Total	$220,440	$79,350	$31,890	$30,720	$14,220	$13,020	$24,330	$26,910

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

†The Southern region consists of Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

‡Miscellaneous expenses include personal care items, entertainment, and reading materials.

Table 5. Estimated annual expenditures* on a child by husband-wife families, urban Midwest,† 1996

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous‡
Before-tax income: Less than $34,800 (Average=$21,800)								
0-2	$5,130	$1,920	$740	$630	$350	$350	$640	$500
3-5	5,260	1,900	830	610	340	340	720	520
6-8	5,420	1,870	1,080	720	380	380	430	560
9-11	5,510	1,720	1,310	790	420	420	260	590
12-14	6,250	1,900	1,370	910	710	430	180	750
15-17	6,180	1,530	1,490	1,250	620	450	300	540
Total	$101,250	$32,520	$20,460	$14,730	$8,460	$7,110	$7,590	$10,380
Before-tax income: $34,800 to $58,600 (Average=$46,400)								
0-2	$7,350	$2,670	$900	$1,010	$410	$480	$1,060	$820
3-5	7,540	2,650	1,050	980	400	450	1,180	830
6-8	7,640	2,620	1,340	1,090	450	520	750	870
9-11	7,670	2,470	1,590	1,160	500	560	490	900
12-14	8,360	2,650	1,600	1,280	840	570	360	1,060
15-17	8,500	2,280	1,790	1,630	740	590	620	850
Total	$141,180	$46,020	$24,810	$21,450	$10,020	$9,510	$13,380	$15,990
Before-tax income: More than $58,600 (Average=$87,800)								
0-2	$11,040	$4,290	$1,200	$1,450	$540	$560	$1,610	$1,390
3-5	11,290	4,270	1,360	1,430	530	530	1,760	1,410
6-8	11,250	4,240	1,640	1,530	580	610	1,210	1,440
9-11	11,230	4,090	1,930	1,600	640	650	840	1,480
12-14	12,020	4,270	2,020	1,720	1,060	660	650	1,640
15-17	12,330	3,900	2,140	2,090	950	690	1,130	1,430
Total	$207,480	$75,180	$30,870	$29,460	$12,900	$11,100	$21,600	$26,370

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the regional Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

†The Midwest region consists of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

‡Miscellaneous expenses include personal care items, entertainment, and reading materials.

Table 6. Estimated annual expenditures* on a child by husband-wife families, Rural areas,† 1996

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous‡
Before-tax income: Less than $35,200 (Average=$22,000)								
0-2	$5,190	$1,630	$750	$830	$360	$430	$660	$530
3-5	5,320	1,610	840	810	350	410	750	550
6-8	5,470	1,580	1,090	920	390	470	440	580
9-11	5,570	1,430	1,330	990	440	500	270	610
12-14	6,330	1,610	1,390	1,110	750	510	190	770
15-17	6,280	1,230	1,510	1,450	660	540	320	570
Total	$102,480	$27,270	$20,730	$18,330	$8,850	$8,580	$7,890	$10,830
Before-tax income: $35,200 to $59,200 (Average=$46,800)								
0-2	$7,440	$2,400	$910	$1,200	$430	$560	$1,100	$840
3-5	7,650	2,380	1,060	1,180	420	540	1,220	850
6-8	7,730	2,340	1,350	1,290	470	610	780	890
9-11	7,760	2,190	1,610	1,360	520	650	510	920
12-14	8,480	2,370	1,620	1,480	880	670	380	1,080
15-17	8,640	2,000	1,810	1,840	780	690	650	870
Total	$143,100	$41,040	$25,080	$25,050	$10,500	$11,160	$13,920	$16,350
Before-tax income: More than $59,200 (Average=$88,600)								
0-2	$11,180	$4,050	$1,210	$1,640	$560	$650	$1,670	$1,400
3-5	11,420	4,030	1,370	1,620	550	620	1,810	1,420
6-8	11,400	4,000	1,660	1,730	600	710	1,250	1,450
9-11	11,370	3,850	1,950	1,800	660	750	870	1,490
12-14	12,170	4,030	2,040	1,920	1,100	760	670	1,650
15-17	12,510	3,650	2,160	2,300	990	790	1,180	1,440
Total	$210,150	$70,830	$31,170	$33,030	$13,380	$12,840	$22,350	$26,550

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the population size Consumer Price Index. The figures represent estimated expenses on the younger child in a two-child family. Estimates are about the same for the older child, so to calculate expenses for two children, figures should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.24. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.77. For expenses on all children in a family, these totals should be summed.

†Rural areas are places of fewer than 2,500 people outside a Metropolitan Statistical Area.

‡Miscellaneous expenses include personal care items, entertainment, and reading materials.

Table 7. Estimated annual expenditures* on a child by single-parent families, overall United States, 1996

Age of child	Total	Housing	Food	Transportation	Clothing	Health care	Child care and education	Miscellaneous†
Before-tax income: Less than $34,700 (Average=$14,500)								
0-2	$4,770	$1,940	$890	$670	$330	$190	$410	$340
3-5	5,360	2,210	940	590	350	270	560	440
6-8	6,060	2,340	1,180	690	420	320	510	600
9-11	5,660	2,250	1,370	490	420	410	240	480
12-14	6,120	2,250	1,380	570	710	440	310	460
15-17	6,830	2,390	1,500	900	830	430	240	540
Total	$104,400	$40,140	$21,780	$11,730	$9,180	$6,180	$6,810	$8,580
Before-tax income: $34,700 or more (Average=$52,600)								
0-2	$10,940	$4,180	$1,380	$2,060	$480	$430	$1,010	$1,400
3-5	11,720	4,440	1,460	1,980	500	570	1,270	1,500
6-8	12,480	4,580	1,750	2,070	580	660	1,180	1,660
9-11	12,080	4,490	2,110	1,880	580	790	690	1,540
12-14	12,800	4,490	2,060	1,960	960	830	980	1,520
15-17	13,250	4,630	2,180	2,120	1,100	820	800	1,600
Total	$219,810	$80,430	$32,820	$36,210	$12,600	$12,300	$17,790	$27,660

*Estimates are based on 1990-92 Consumer Expenditure Survey data updated to 1996 dollars using the Consumer Price Index. The figures represent estimated expenses on the younger child in a single-parent, two-child family. For estimated expenses on the older child, multiply the total expense for the appropriate age category by 0.93. To estimate expenses for two children, the expenses on the younger child and older child—after adjusting the expense on the older child downward—should be summed for the appropriate age categories. To estimate expenses for an only child, multiply the total expense for the appropriate age category by 1.35. To estimate expenses for each child in a family with three or more children, multiply the total expense for each appropriate age category by 0.72—after adjusting the expenses on the older children downward. For expenses on all children in a family, these totals should be summed.

†Miscellaneous expenses include personal care items, entertainment, and reading materials.

Poverty Thresholds

Weighted average poverty thresholds[1] for nonfarm families of specified size, 1970–96

Calendar year	Unrelated individuals			Families of 2 persons or more							Annual average CPI, all items (1982–84 = 100)
				2 persons			3 persons	4 persons	5 persons	6 persons	
	All ages	Under age 65	Age 65 or older	All ages	Householder under age 65	Householder age 65 or older					
1970	1,954	2,010	1,861	2,525	2,604	2,348	3,099	3,968	4,680	5,260	38.8
1971	2,040	2,098	1,940	2,633	2,716	2,448	3,229	4,137	4,880	5,489	40.5
1972	2,109	2,168	2,005	2,724	2,808	2,530	3,339	4,275	5,044	5,673	41.8
1973	2,247	2,307	2,130	2,895	2,984	2,688	3,548	4,540	5,358	6,028	44.4
1974	2,495	2,562	2,364	3,211	3,312	2,982	3,936	5,038	5,950	6,699	49.3
1975	2,724	2,797	2,581	3,506	3,617	3,257	4,293	5,500	6,499	7,316	53.8
1976	2,884	2,959	2,730	3,711	3,826	3,445	4,540	5,815	6,876	7,760	56.9
1977	3,075	3,152	2,906	3,951	4,072	3,666	4,833	6,191	7,320	8,261	60.6
1978	3,311	3,392	3,127	4,249	4,383	3,944	5,201	6,662	7,880	8,891	65.2
1979	3,689	3,778	3,479	4,725	4,878	4,390	5,784	7,412	8,775	9,914	72.6
1980	4,190	4,290	3,949	5,363	5,537	4,983	6,565	8,414	9,966	11,269	82.4
1981	4,620	4,729	4,359	5,917	6,111	5,498	7,250	9,287	11,007	12,449	90.9
1982	4,901	5,019	4,626	6,281	6,487	5,836	7,693	9,862	11,684	13,207	96.5
1983	5,061	5,180	4,775	6,483	6,697	6,023	7,938	10,178	12,049	13,630	99.6
1984	5,278	5,400	4,979	6,762	6,983	6,282	8,277	10,609	12,566	14,207	103.9
1985	5,469	5,593	5,156	6,998	7,231	6,503	8,573	10,989	13,007	14,696	107.6
1986	5,572	5,701	5,255	7,138	7,372	6,630	8,737	11,203	13,259	14,986	109.6
1987	5,778	5,909	5,447	7,397	7,641	6,872	9,056	11,611	13,737	15,509	113.6
1988	6,024	6,155	5,674	7,704	7,958	7,158	9,435	12,092	14,305	16,149	118.3
1989	6,311	6,451	5,947	8,076	8,343	7,501	9,885	12,675	14,990	16,921	124.0
1990	6,652	6,800	6,268	8,512	8,794	7,906	10,419	13,360	15,800	17,835	130.7
1991	6,932	7,086	6,532	8,867	9,164	8,238	10,857	13,921	16,457	18,590	136.2
1992	7,141	7,299	6,729	9,132	9,441	8,489	11,187	14,343	16,951	19,146	140.3
1993	7,357	7,517	6,930	9,410	9,726	8,741	11,521	14,764	17,459	19,710	144.5
1994	7,551	7,710	7,107	9,655	9,977	8,964	11,817	15,141	17,896	20,223	148.2
1995	7,761	7,929	7,309	9,935	10,259	9,221	12,156	15,570	18,407	20,808	152.4
1996[2]	7,992	8,163	7,525	10,226	10,562	9,491	12,517	16,029	18,951	21,418	156.9

[1]The **poverty thresholds** are used by the Bureau of the Census to prepare its statistical estimates of the number ofndividuals and families in poverty. The **poverty guidelines** are a simplified version of these poverty thresholds and are issued by the Department of Health and Human Services for administrative purposes. The poverty guidelines are used to dtermine whether a person or family is financially eligible for assistance or services under a particular Federal program.

[2]Preliminary data: 1995 weighted average poverty levels raised by 2.95 percent to correspondwith the 1996 increase from the 1995 Consumer Price Index (CPI-U) for all urban consumers.

Cost of Food at Home

Cost of food at home estimated for food plans at four cost levels, June 1997, U.S. average[1]

Sex–age group	Cost for 1 week				Cost for 1 month			
	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan
FAMILIES								
Family of 2:[2]								
20 - 50 years	$56.40	$71.30	$88.00	$109.50	$244.40	$308.70	$381.50	$474.20
51 years and over	53.10	68.50	84.70	101.50	230.00	296.90	367.20	440.00
Family of 4:								
Couple, 20 - 50 years and children----								
1 - 2 and 3 - 5 years	82.00	102.60	125.50	154.30	355.20	444.30	544.00	668.70
6 - 8 and 9 - 11 years	94.30	120.80	150.80	181.70	408.60	523.30	653.50	787.10
INDIVIDUALS[3]								
Child:								
1 - 2 years	14.70	18.00	21.10	25.50	63.80	78.10	91.40	110.70
3 - 5 years	16.00	19.80	24.40	29.30	69.20	85.60	105.80	126.90
6 - 8 years	19.70	26.20	32.70	38.10	85.20	113.60	141.70	164.90
9 - 11 years	23.30	29.80	38.10	44.10	101.20	129.10	165.00	191.10
Male:								
12 - 14 years	24.20	33.70	41.80	49.20	104.90	146.00	180.90	213.00
15 - 19 years	25.00	34.70	43.20	50.00	108.40	150.50	187.30	216.70
20 - 50 years	27.00	34.50	43.20	52.30	117.00	149.40	187.30	226.70
51 years and over	24.40	33.00	40.60	48.70	105.60	142.80	175.90	211.10
Female:								
12 - 19 years	24.20	29.00	35.20	42.50	104.70	125.70	152.50	184.20
20 - 50 years	24.30	30.30	36.80	47.20	105.20	131.20	159.50	204.40
51 years and over	23.90	29.30	36.40	43.60	103.50	127.10	157.90	188.90

[1]Assumes that food for all meals and snacks is purchased at the store and prepared at home. Estimates for the thrifty food plan were computed from quantities of foods published in *Family Economics Review* 1984(*1*). Estimates for the other plans were computed from quantities of foods published in *Family Economics Review* 1983(*2*). The costs of the food plans are estimated by updating prices paid by households surveyed in 1977–78 in USDA's Nationwide Food Consumption Survey. USDA updates these survey prices using information from the Bureau of Labor Statistics, *CPI Detailed Report*, table 4, to estimate the costs for the food plans.

[2]Ten percent added for family size adjustment. See footnote 3.

[3]The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 percent; 2-person—add 10 percent; 3-person—add 5 percent; 5- or 6-person—subtract 5 percent; 7- or more-person—subtract 10 percent.

Consumer Prices

Consumer Price Index for all urban consumers [1982-84 = 100]

Group	Unadjusted indexes			
	June 1997	May 1997	April 1997	June 1996
All items	160.3	160.1	160.2	156.7
Food	156.6	156.6	156.6	152.6
Food at home	157.3	157.5	157.5	153.4
Food away from home	156.6	156.3	156.2	152.3
Housing	156.9	155.9	155.8	152.7
Shelter	176.0	175.3	175.3	170.7
Renters' costs[1]	186.6	185.3	186.3	180.0
Homeowners' costs[1]	181.1	180.6	180.2	176.0
Household insurance[1]	165.3	164.5	163.8	160.7
Maintenance and repairs	143.3	143.2	142.5	138.8
Maintenance and repair services	150.0	149.9	148.9	144.6
Maintenance and repair commodities	134.1	134.1	133.6	130.9
Fuel and other utilities	131.9	129.0	128.9	128.4
Fuel oil and other household fuel commodities	98.0	100.4	102.1	94.6
Gas (piped) and electricity	127.5	121.9	121.7	124.1
Household furnishings and operation	125.7	125.8	125.5	124.5
Housefurnishings	111.2	111.5	111.1	111.2
Apparel and upkeep	132.4	135.3	136.1	130.8
Apparel commodities	128.6	131.8	132.7	127.2
Men's and boys' apparel	129.0	132.0	131.4	127.1
Women's and girls' apparel	125.6	129.9	131.9	122.8
Infants' and toddlers' apparel	132.9	133.8	133.7	129.1
Footwear	126.3	129.1	129.3	127.1
Apparel services	163.2	162.9	162.6	159.7
Transportation	144.0	144.4	144.8	144.0
Private transportation	140.7	141.0	141.3	141.0
New vehicles	144.2	144.6	145.2	143.5
Used cars	151.8	153.9	154.3	157.2
Motor fuel	105.9	105.7	106.0	111.2
Maintenance and repairs	162.6	162.2	161.9	157.7
Other private transportation	176.7	177.0	177.3	173.1
Public transportation	186.6	188.1	189.8	182.2
Medical care	234.4	234.2	233.8	227.8
Medical care commodities	216.0	215.6	215.2	210.5
Medical care services	238.7	238.5	238.1	231.9
Professional medical services	215.5	215.2	214.7	207.9
Entertainment	162.7	162.2	162.2	159.0
Entertainment commodities	143.9	143.9	144.1	142.9
Entertainment services	184.5	183.5	183.3	177.9
Other goods and services	223.1	223.1	222.7	214.0
Personal care	152.8	152.6	152.7	149.6
Toilet goods and personal care appliances	144.2	144.1	144.5	143.9
Personal care services	162.6	162.3	162.0	155.9
Personal and educational expenses	257.3	256.6	256.0	245.1
School books and supplies	237.2	235.9	235.8	224.7
Personal and educational services	259.1	258.3	257.7	246.8

[1]Indexes on a December 1982 = 100 base.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

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